A SPECIAL REPORT

WHAT'S AHEAD IN 1960

BEGINS ON PAGE 115

Construction Methods AND EQUIPMENT

JANUARY, 1960

PRICE $1.00

A McGRAW-HILL PUBLICATION

In California, a slipform paver lays up to 4,000 ft of 24-ft-wide and 8-in.-thick pavement in a 10-hr day.

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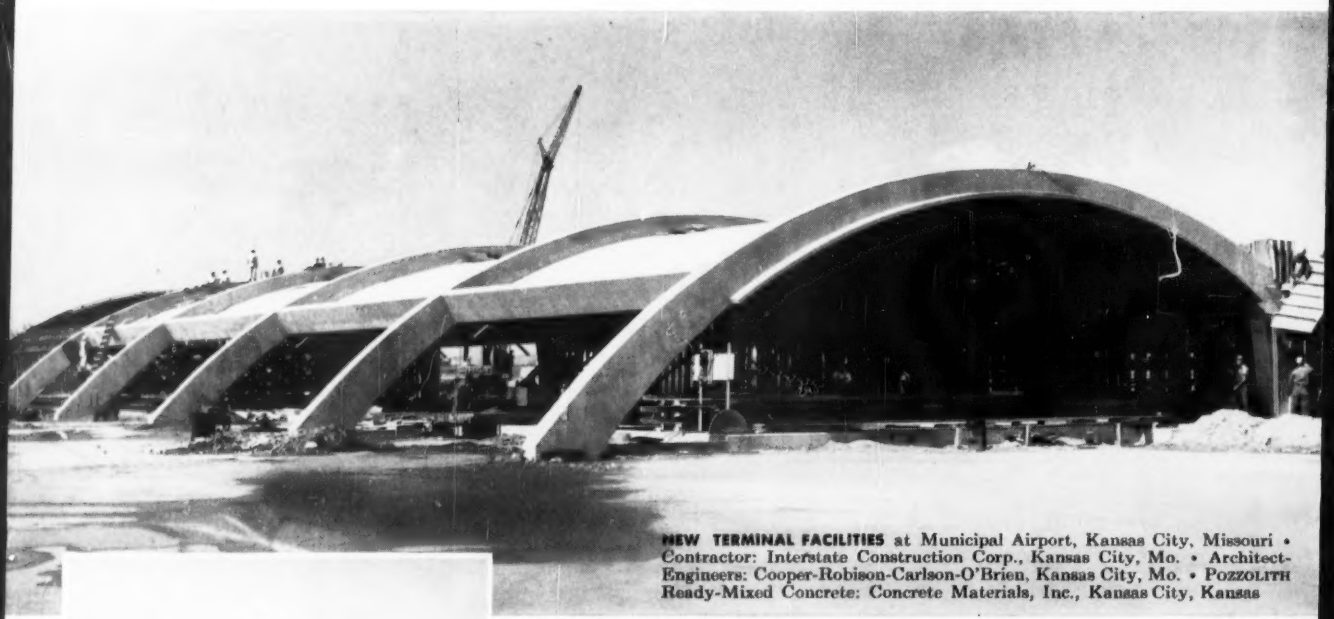
EDWARD D. KELLY, *President*
Interstate Construction Corp.,
Kansas City, Missouri

"We stripped this form in 3 days . . . with POZZOLITH concrete"

"This accelerated schedule saved us the cost of additional forms on the new Kansas City Air Terminal job"



NEW TERMINAL FACILITIES at Municipal Airport, Kansas City, Missouri • Contractor: Interstate Construction Corp., Kansas City, Mo. • Architect-Engineers: Cooper-Robison-Carlson-O'Brien, Kansas City, Mo. • POZZOLITH Ready-Mixed Concrete: Concrete Materials, Inc., Kansas City, Kansas

ROLLING FORM for thin-shell roof is stripped on third day. High early strength of POZZOLITH concrete allows accelerated production schedule . . . cuts contractor costs significantly.

"Concrete strength of 3750 psi in 3 days—that's the kind of performance we got with POZZOLITH concrete on the new Kansas City Municipal Airport Terminal job. Stripping our big rolling form on the third day enabled us to place one 48-foot roof shell section each week.

"To reach the required design strength in minimum time, the job called for extremely low-slump concrete . . . yet it had to be workable enough to consolidate around reinforcing steel in these 3-inch thin-shell sections. With POZZOLITH we got excellent workability, high early strength, and a superior finish with no honeycombing or cracks.

"The Master Builders field man worked closely with the ready-mix concrete producer and concrete technician on-the-job to aid in maintaining batch-to-batch uniformity—so important in critical concreting of this type. POZZOLITH concrete and Master Builders field service gave us an important edge over time and costs on this job."

For lowest cost-in-place . . . superior quality concrete—there's no equal to today's POZZOLITH. Call in the local Master Builders man to demonstrate how POZZOLITH can help put you ahead on your very next job.

The Master Builders Company, Cleveland, Ohio • Division of American-Marietta Company
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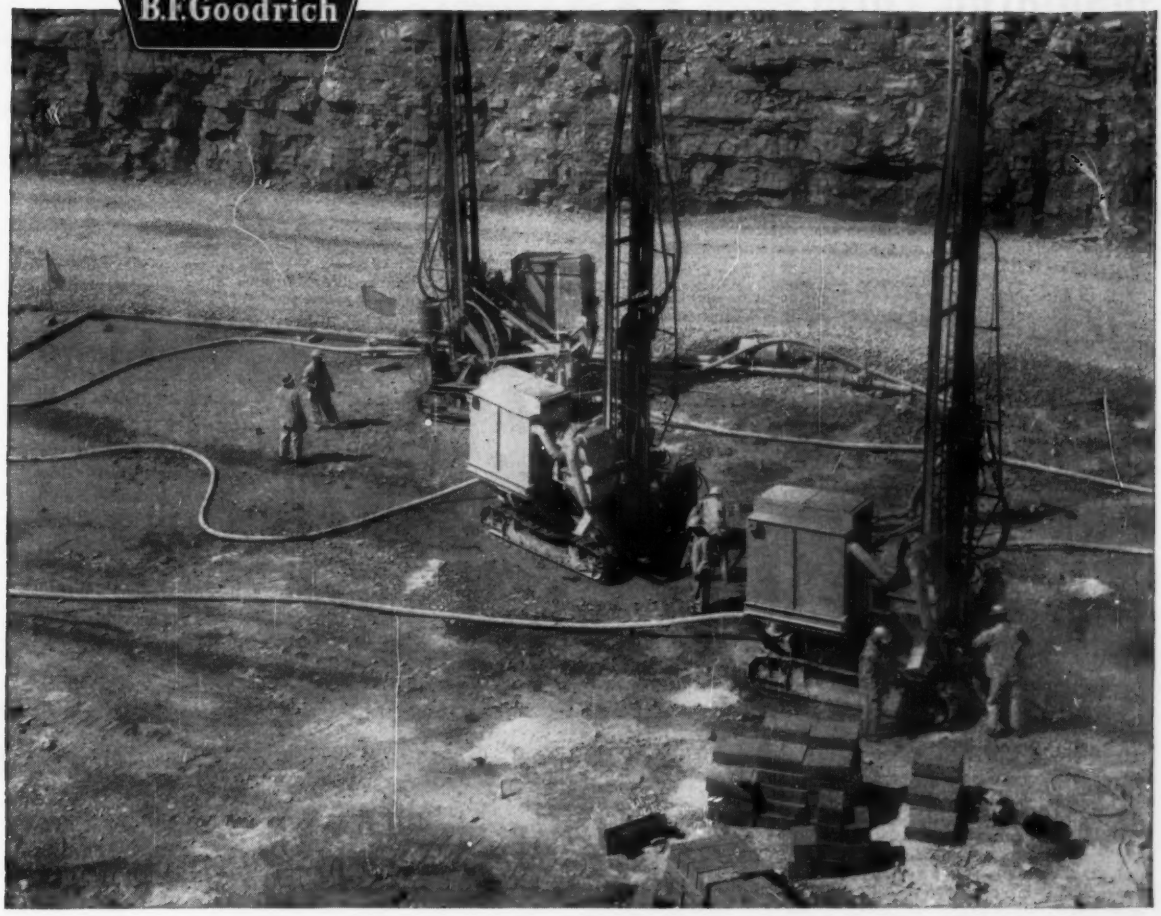
POZZOLITH*

**POZZOLITH is a registered trademark of The Master Builders Co. for its concrete admixture to reduce water and control entrainment of air and rate of hardening.*

B.F.Goodrich



Hose helps dig a ditch that will detour a river

B. F. Goodrich improvements in rubber brought extra savings

THOSE machines are drilling holes for dynamite charges to blast out rock. When the job is done, a mighty river will take a detour down this newly formed channel. Power for the machines comes from compressed air, carried by hose. But on jobs like this, rubber hose used to go to pieces in no time.

When heat from the compressor got into the hose, it would harden the rubber, breaking it into loose, gummy particles that clogged the machine, put it out of action.

B.F.Goodrich engineers went to work on the problem. By adding, subtracting and changing proportions of rubber, they found a special compound for the hose that stands heat without scorching or hardening.

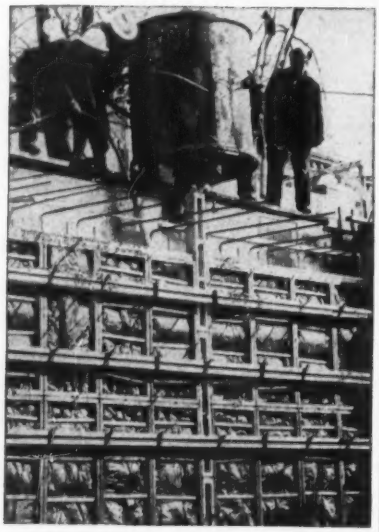
Hose lined with this new rubber was made and put to work. On jobs where air hose used to go to pieces in weeks, B.F.Goodrich hose now lasts months, even years.

Thousands of feet of B.F.Goodrich air hose are in constant use on this job. It's been doing dozens of different jobs, and lasting longer doing them, even though it's dragged over rough, jagged rocks, soaked in water, sometimes battered by flying pieces of rock.

Your B. F. Goodrich distributor has the exact specifications for the B.F.Goodrich air hose described here. And, as a factory-trained specialist in rubber products he can answer your questions about all the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-774, Akron 18, Ohio.*

B.F.Goodrich *industrial rubber products*

Insulated Forms

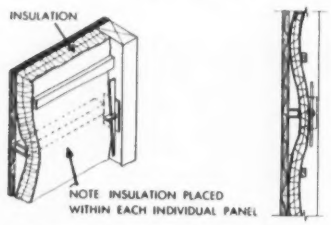


Symons Forms and Balsam Wool Insulation

Save 50% on Cost of Heating & Curing Concrete

C. R. Meyer & Sons Company, Oshkosh, Wisconsin posted this record 50% savings on the new $1,000,000 central office building of the Wisconsin Telephone Company at Oshkosh. Two-inch insulation in 24-inch widths was tacked to the forms. Walls were 12 inches thick and varied in height from 12 to 16 feet.

Pouring was started in January. Temperatures ranged from five to 25 degrees above zero. Concrete at time of pour was held in the 70 to 80-degree range. During one pour a



Cutaway section of form with insulation

tube was cast in the wall four feet from the top with a thermometer suspended in the bottom. After 24 hours, temperature at center of concrete rose to 105 degrees and after five days the concrete went back to 70.

Symons forms, shores and column clamps may be rented with purchase option. FREE literature on Symons' products is available upon request.

Symons

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Chicago 39, Illinois

Construction Methods AND EQUIPMENT

JANUARY, 1960

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Robert K. Tomlin was appointed editor of CONSTRUCTION METHODS in January 1923, was succeeded by Waldo G. Bowman in January 1946, by Harold W. Richardson in February 1949, and by Henry T. Perez in June 1954.

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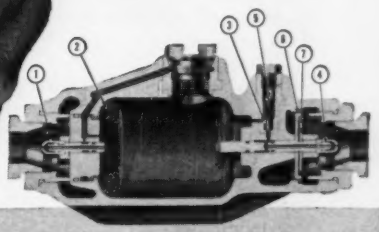

That's right! *You'll never burn out an air tool with the new Le Roi LO-380 on the job!* When the oiler runs dry, it automatically shuts off the air! The "no oil — no air" design prevents unnecessary wear on critical parts — cuts repair bills — extends tool life!

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Oiler permits easy external adjustment of oil feed — provides full one-pint capacity. Lightweight — only 9 lbs. — it's easy to use, easy to move—operates in any position. Oiler can be refilled under pressure while air tool is in operation.

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PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

AT-506

ON THE COVER

Gordon H. Ball, general contractor from Danville, Calif., paves 19 mi of highway with a slipform machine originally built for lining a flood channel. The rig is fitted with a series of probes, or feeler gages that operate off a pre-strung guide wire to adjust it automatically to correct line and grade. See story on page 82.

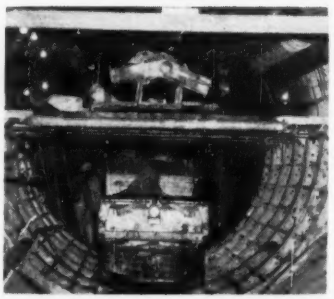
Pay Dirt in This Issue

Freezing Keeps Shaft Dry, Holds Dirt in Place 86

Because they can't pump out ground water in the shaft, the contractor freezes the earth into a solid cylinder 123 ft deep and excavates the 14½-ft shaft through the center.

Big Fleet Carves Deep Rock Cuts 149

This New Jersey highway job involves 3,600,000 yd of excavation, about 80% of it rock. Almost half of the material will come out of a single cut through Jugtown Mountain.



Overhead Trolleys Move Concrete Tunnel Forms. .165

Overhead trolleys suspended from the lower flanges of steel beams handle concrete forms in a sewer tunnel project. The contractor-built device is easy to install.

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WHAT'S AHEAD—

A SPECIAL REPORT

To help contractors plan their 1960 operations *Construction Methods* presents this forecast of how much business—and what types—will be available and what the trends will be in competition, methods, materials prices, labor, and equipment 115

New Slipform Paver Meets Tight California Specs 82
Pair of Spreaders Lays Base 101
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NEXT MONTH

An Oregon roadbuilder paves mesh-reinforced concrete highway slab full depth in one pass. First he dumps and spreads concrete to the top of the forms, then he vibrates mesh and joint dowels down to correct depth with two machines he built himself. The novel procedure has upped his progress by 33%.

Photo Credits—72 (top left) Morrison-Knudsen, (bottom) Lennart J: Sen-Carlen; 87 (bottom) Art Green, Inc; 88 (top) Art Green, Inc; 170 (bottom) Aero Portraits.

"FOR THE TOUGH ONES, WE LIKE GORMAN-RUPP EXTRA HEAVY DUTY PUMPS"

Model 16A2-IND30 starting up for the day's work after an overnight snowfall of 20 inches and in temperatures of 10 to 15 degrees above zero.

"Here, with river silt, gravel, muddy water, and ice . . .

"in trenching below river level, these Gorman-Rupp Extra Heavy Duty Pumps do a great job. We know we can depend on them for this type of work, because we started using them 13 years ago and have liked their performance ever since. We use other types of Gorman-Rupp Contractors Pumps, too, depending on the circumstances."

So says Mr. P. J. Milano, superintendent for Milano Construction Company, Erie, Pa., who uses Gorman-Rupp equipment to beat the "must" schedules, regardless of winter weather or tough working conditions.

This is a typical field report of Gorman-Rupp in action. See your nearest distributor, and remember—wherever there's a tough pumping job to be done, use a dependable, trouble-free Gorman-Rupp Pump.

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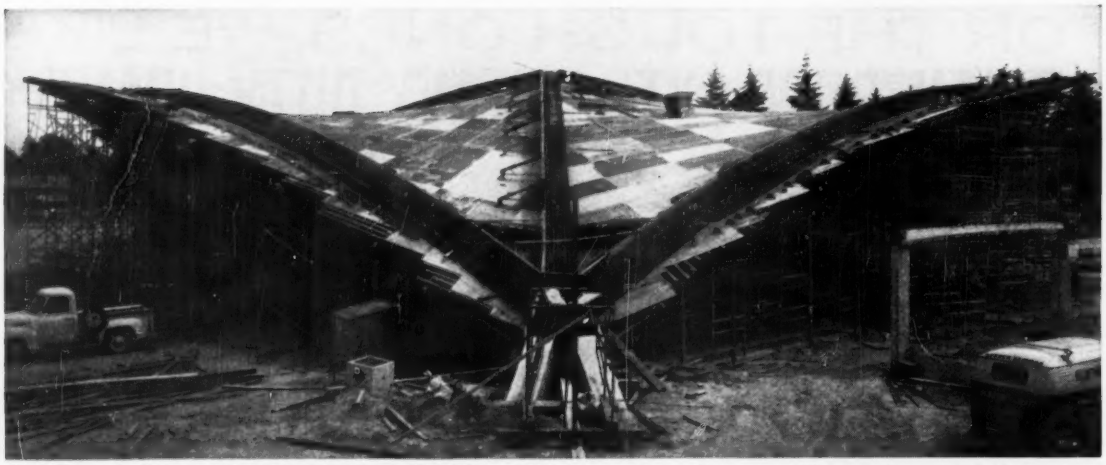
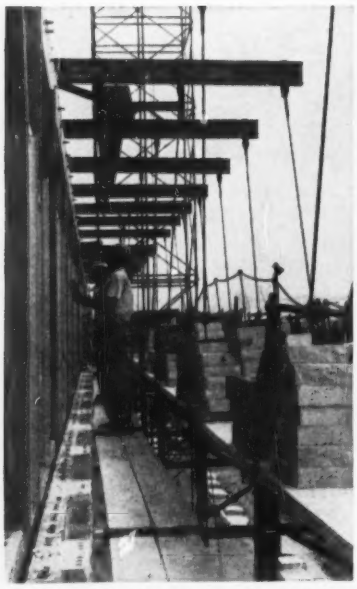


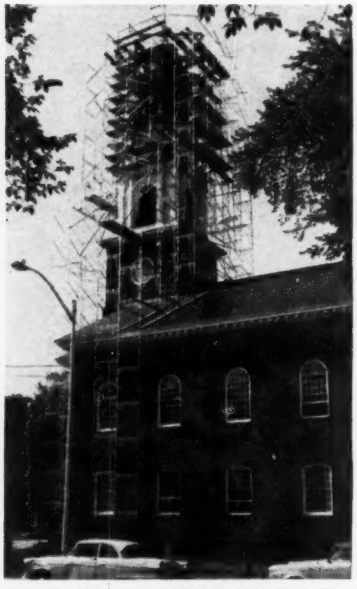
SHORING HYPERBOLIC PARABOLOID STRUCTURE—On the new auditorium for Edward S. Ingraham H. S., Seattle, Sound Construction Co., general contractor, uses 1300 standard "Trouble Saver" Shoring frames to support dome and slab formwork for this concrete hyperbolic paraboloid structure. Design involves three anchors, set 161′ apart, from which three center beams, 2′6″ x 4″, arch to 35′ high. Two perimeter beams per anchor fan out and intersect at 28′ high.

Scaffolding and Shoring Methods . . . by PS CO.



PASS BARRIERS EASILY—Special Retractable Putlogs on "Gold Medal" ® Safety Scaffold Machines provide close-in working platforms and permit Scaffold to clear sun shades on new Loren Building, New Orleans, La. Quinn Construction Co., contractor.

ROLL TO UNUSUAL JOBS—"Trouble Saver" Rolling Scaffolding provides quick access to steep laminated wood bent roof for complicated hand cutting and fitting. Nelson Brothers Construction Co., contractor, Good Shepherd Lutheran Church, Des Plaines, Ill.



BUILD UP TO WORK HIGH—For steeple repairs on the United Church, New Haven, Dwight Bldg. Co., contractor, uses this "Trouble Saver" Sectional Steel Scaffolding erected rapidly from 245 frames and 30 trusses bearing on the ground and the roof.

Complete scaffolding equipment and engineering service offered through nation-wide sales offices or representatives. Look under Patent Scaffolding in the Yellow Pages for your nearest source.

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Don't take our word for it—ask Northwest owners! Northwests stay on the job! *They are always ready to go. We hear it everywhere, and Northwest owners will tell you so.* The smooth coordination of action between assemblies for machine movements—the Northwest Dual Independent Crowd that utilizes force most other independent crowd shovels waste—the easy, accurate control of the drum clutches through the Feather-Touch Clutch Control, with its true *feel* of the load—the precision in handling and spotting loads made possible by the smooth acting Uniform Pressure Swing Clutches—and the many other Northwest advantages backed by Northwest ruggedness of construction take output beyond mere hourly production.

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Goodyear makes rims in widths up to 37″ and diameters up to 49″. To prevent premature tire and rim failure, it pays to buy and specify rims job-fitted by Goodyear. See your local rim distributor, or write: Goodyear, Metal Products Division, Akron 16, Ohio.

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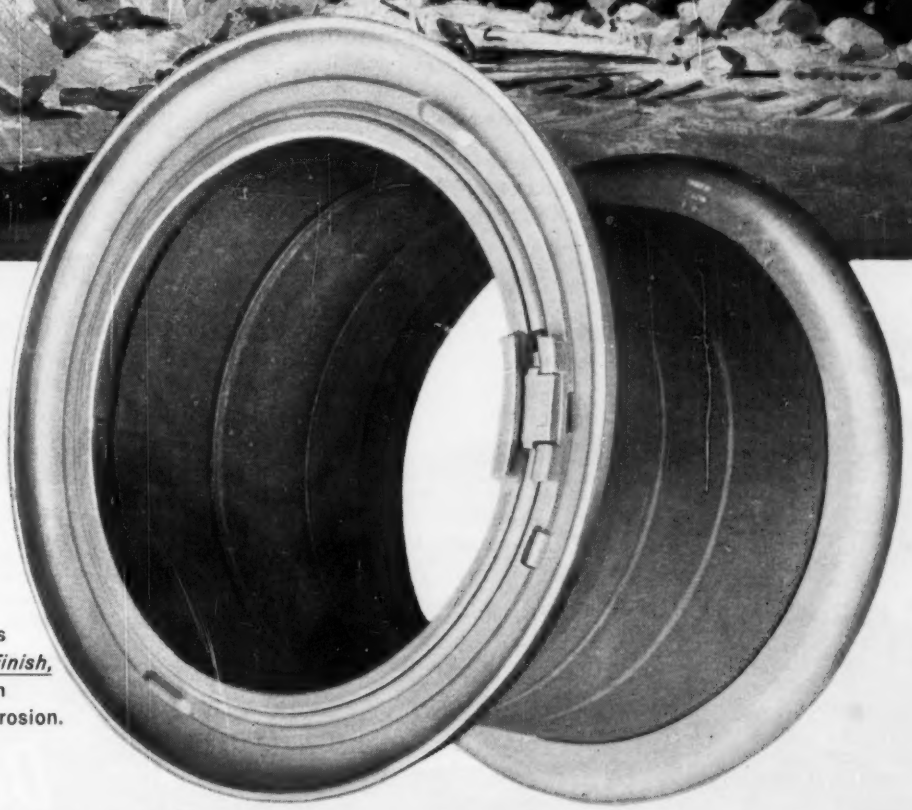
–84 pages of facts and pictures on Goodyear's complete line of rims for every type of vehicle.

Tru-Seal – T. M. The Godyear Tire & Rubber Company, Akron, Ohio

Rim



Only Goodyear Rims
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against rust and corrosion.

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Now Dodge builds ém extra-big... GAS OR DIESEL... G.V.W.'s to 53,000 lbs.!

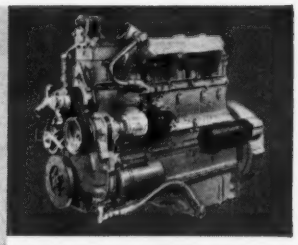
You're looking at a totally *new* kind of Dodge truck. Big, yet its short 89¾" bumper-to-back-of-cab dimension keeps it agile and easy to handle. Compact, yet its exclusive Servi-Swing fenders make it easy to service.

A truck quality-built for *toughest* construction jobs!

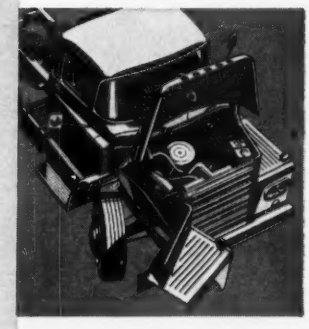
1960 Dodge Cab-Forwards offer new gasoline V-8 engines and four big Cummins diesels. Strong new heat-treated chrome-manganese frames, aluminized mufflers, big 14- and 15-inch clutches. And a whole line of new transmissions, with up to 20 speeds forward!

Big choice of models includes tandem and single-rear-axle types. Many wheelbases of ideal length for dump, rock and mixer bodies. Tractors, all the way up to 76,800 lbs. G.C.W.!

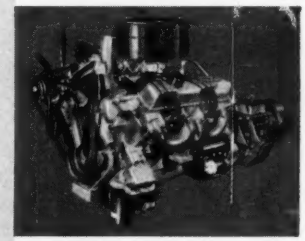
Check the new Dodge "big ones" now. Your Dodge dealer's is the place . . . and delivery is quick!



CUMMINS DIESELS are now available in Dodge for big fuel savings and extra stamina in construction hauling. Four engines available, with displacements from 464 to 743 cu. in.; horsepower to 220; torque to 605 lb.-ft.



SERVI-SWING FENDERS . . . Newest idea in engine servicing! Just flick a latch and these fenders open outward, making the engine easy to reach from either side. Check oil, water, battery without raising the hood!



NEW GAS V-8's, with 361- and 413-cu. in. displacements, deliver up to 228 horsepower. They're packed with premium features, such as tri-metal bearings and oil cooler, to insure peak performance and long life.

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TRUCKS

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Construction News From Washington

Washington, D.C.
January, 1960

Public Works Politics

Pres. Eisenhower will give in a notch or two on public works policy as a nod to good politics this election year. Even before the budget was completed, his aides let it be know that he would recommend money to start an unspecified number of hydro projects.

Politically, this makes sense. Last year, the Democrats overrode vetoes of 67 new starts. This year, the Administration team, decided it might as well get some of the credit by taking a more flexible line.

Contractors Must Pay for Plans

Bidders on Corps of Engineer projects—and they run into the thousands each year—now must pay for the plans they have to take out to make a bid.

The Corps of Engineers used to leave it up to its district offices. In some districts, bidders got plans for nothing; in others, bidders put up deposits and got the deposits back when they returned the plans.

Now every applicant must buy a full set of half-scale plans at 10 cents per sheet.

There's a minimum of $5 for sets that run less than 50 sheets but more than five; on jobs requiring five or less sheets, the plans are free to those with a legitimate interest. Those applicants who have bought a half-scale set are eligible to buy full-scale prints at 50 cents per sheet.

New Rule on Bid Errors

Low bidders on Corps of Engineer projects are no longer allowed to withdraw their bids because of errors if the amount of the error falls within certain specified limits.

For instance, if the bid is $250,000 or less, the bidder waives up to 5% of his bid. If the bid is $1 million or more, the bidder waives $37,500 plus 2% of the amount, over $1 million.

Up to now the Associated General Contractors are sticking with their 1958 recommendation of this issue: Let a low bidder who claims an error withdraw his bid, but don't let him submit a corrected bid. Instead, make the award on the basis of bids remaining after the erroneous bid has been withdrawn.

Officials say the new procedure is still on a test basis. But they hope it will do these two things:

1. Eliminate the nuisance of adjudication of alleged errors in bids.

continued on next page

2. Save money by protecting the government against withdrawal or rejection of low bids which are wholly acceptable except for relatively minor errors uncovered by the bidder afterward.

More Federal Buildings

Contractors can count on construction money for a good number of federal buildings to come out of the current session of Congress. The lawmakers are impatient to make progress on several big projects.

Coming up for consideration will be 25 jobs that are well along to the contract letting stage. These 25 include 17 held over from the defunct lease-purchase program and eight others authorized by Congress to house specific agencies. Estimated construction costs add up to more than $500 million.

Contract awards for these jobs—if Congress votes the money—will be in addition to jobs already scheduled for letting by the General Services Administration. Eleven projects adding up to $24.5 million now are scheduled to go to contract in the next six months, and four more worth $34 million are on the schedule for the fiscal year that begins July 1.

Canadian Hydro Projects

Canada's federal government and private interests from overseas both are planning major projects to develop the hydro-electric potential of British Columbia. Dirt should be moving on big jobs in 1961.

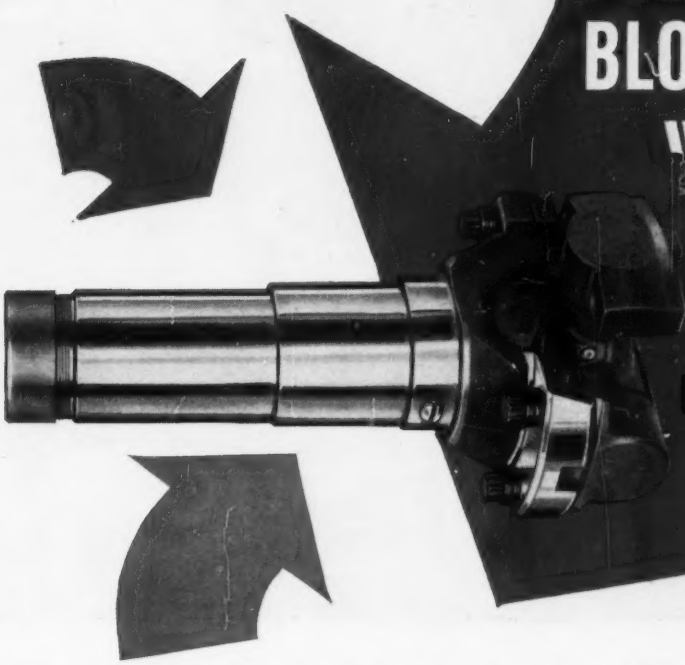
The Canadian government cleared a hurdle last month when the International Joint Commission signed a set of principles—highly favorable to Canada—for cooperative U. S.-Canadian development of the Columbia River. If Washington and Ottawa are able this year to negotiate an agreement on the basis of these prinicples, Canada will lose no time getting started on the top-priority project, the $300-million Mica Creek Dam and Power Plant. Following Mica, Canada plans a dozen additional projects that will cost a total of $1 billion or more.

The Swedish Wenner-Gren industrial development group also has big plans. This combine holds mineral and water concessions from the British Columbia provincal government for the northern third of the province. In December, the group's Peace River Development Co. presented a $610-million water-harnessing scheme to the Vancouver government. If approved as expected, the company promises a definite start on its project this year.

The Peace River Project would include at least two major dams, a 550-mile transmission line, and 3,100,000 kw of generating capacity. The first phase would include a $375-million dam 600 ft high and more than a mile long.

MORE MUSCLE IN A SMALLER PACKAGE... THE NEW

BLOOD BROTHERS "58WB" UNIVERSAL JOINT



To meet new drive line requirements on its 1960 model trucks, a major truck manufacturer needed a special, lightweight but strong universal joint—a unit that would provide greater torque capacity without increasing swing diameter. Rockwell-Standard engineers were consulted, and in a cooperative effort the new "58WB" was developed. It is now being used on several models in the manufacturer's 1960 line.

The design of the new "58WB" is applicable to medium-weight trucks, off-highway equipment, small crawlers and front-end loaders of approximately 1½ yards capacity. It can be made up as a complete drive line, furnished as a component part for a manufacturer's own drive line, or utilized in close-coupled drives. The "58WB" offers these outstanding advantages:

★ **More capacity than any joint of comparable size.** The "58WB" provides 39,000 inch pounds torque capacity with a swing diameter of only six inches!

★ **Key-type yoke.** Requires only four bolts for installation on original equipment. Saves downtime for repairs.

For more details about the new "58WB" or for help in solving any problems involving universal joints or drive lines, write or call us today.

Another Product of...

ROCKWELL-STANDARD
CORPORATION
Universal Joint Division, Allegan, Michigan

Stone & Webster Engineering Corporation

depends on P&H "PROFIT·LIFTS" and "PROFIT·YARDS" on remote Baker River Project

The steady, reliable performance of these P&H rigs helps Stone & Webster get the cost lifts and cost yards out of the way fast on many jobs. They get going on those P&H "Profit-Lifts" and "Profit-Yards" early in the day . . . every day.

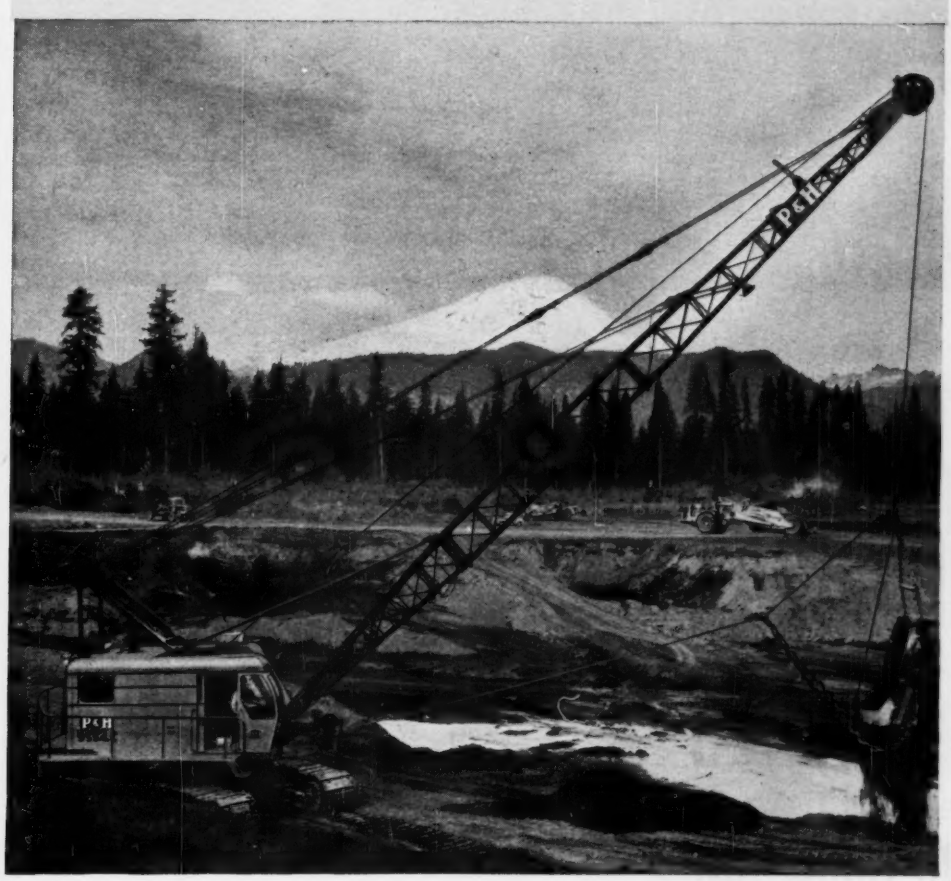
Stone & Webster gets these benefits from P&H features like the P&H planetary boom hoist that provides positive, "inching" control of the boom . . . MAGNETORQUE®, the frictionless, electro-magnetic swing units and propel that eliminate swing linings—result in faster work cycles.

And—when the going gets extra rough, they get day-in, day-out production without a hitch, because of conservative P&H ratings and extra reserve power, strength and stability.

Engineers & Constructors: STONE & WEBSTER ENGINEERING CORPORATION

Equipment: 82-ton P&H 955A Crawler Crane
2½ yd. P&H 955A-LC Dragline

Project: Baker River Project of Puget Sound Power and Light Company, 20 miles north of Concrete, Washington



These features help all P&H owners to get some of tomorrow's work done today —which is why in the last four years, Harnischfeger sales have grown at a rate which substantially exceeds that of the industry as a whole.

For more information about P&H excavators and truck cranes of a specific size, or to set a date for a demonstration, call your P&H dealer—or drop a note to Harnischfeger Corporation, Construction & Mining Division, Milwaukee 46, Wisconsin.

HARNISCHFEGER

Milwaukee 46, Wisconsin

P&H

THE P&H LINE: Truck cranes: 12½ through 80-tons
Power shovels: ½ through 3½ yds.
Crawler cranes: 20 through 110-tons

P&H equipment is also manufactured in Australia, Brazil, Canada, Germany and Japan

See your P & H dealer . . . for your complete sales and service needs

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LYONS MACHINERY COMPANY Little Rock, Arkansas
K.C.Y. TRACTOR CO., LTD. El Cajon, California
NOREL SALES & SUPPLY CO., INC. Eureka, California
ALLIED EQUIPMENT COMPANY Fresno, California
BEALSHAW CORPORATION, Los Angeles 22, California
BLAKEMORE EQUIPMENT COMPANY Oakland 3, California
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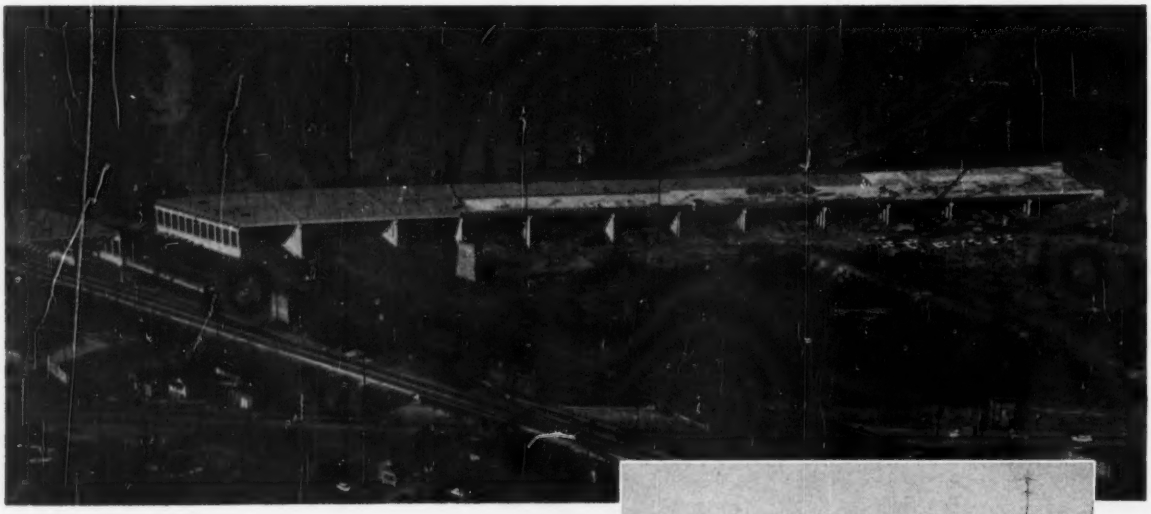

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strengthen new Illinois interstate system

This section of the new East St. Louis Expressway will soon become a part of the Interstate and Defense Highway U. S. Route 70 and 44. Approximately 1100 tons of Laclede reinforcing bars were furnished for this project, which spans the major mainline railroad tracks connecting St. Louis and the East.

Put the complete line of Laclede reinforcing steels and services to work on *your* next job.

CONTRACTORS
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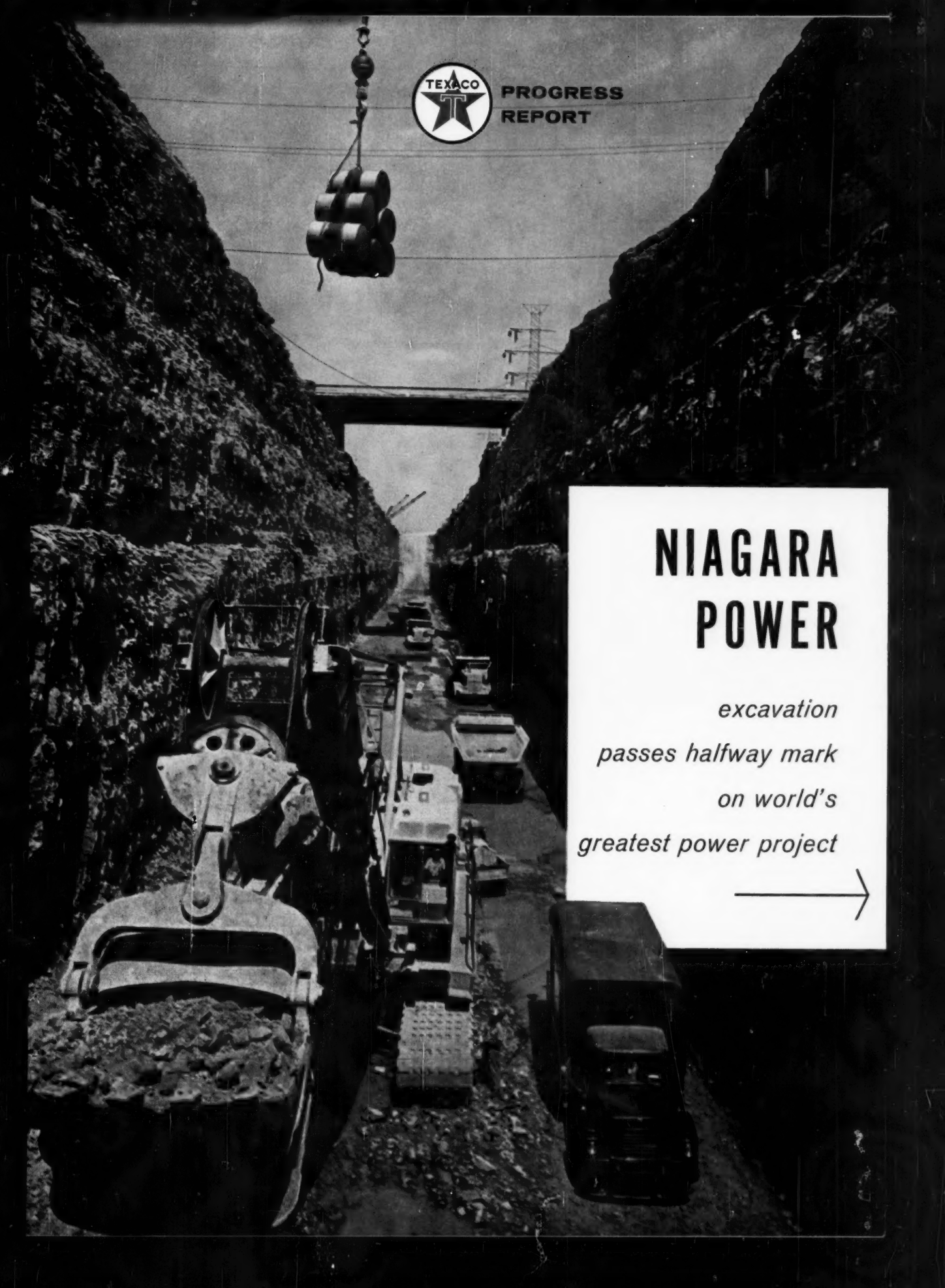
LACLEDE

LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI ◆ Producers of Steel for Industry and Construction



NIAGARA POWER

excavation passes halfway mark on world's greatest power project

THE NIAGARA GENERATING PLANT, a $99-million Merritt-Chapman & Scott project, stretches over 1000 feet along the Niagara River. Slated for completion in mid-1962, the giant hydroelectric project will deliver almost 2,000,000 kw to power-hungry industry as far away as Syracuse.

Texaco lubricates 80% of the job as...

Niagara team wrestles 42 million yards of

"Dirt" is flying on the Niagara Project — over 42 million cubic yards of it. Piled into a mountain it could more than bury the Empire State Building. This gives some idea of the tremendous scope of the operation—exceeded only by the St. Lawrence Seaway in the roster of the world's construction projects.

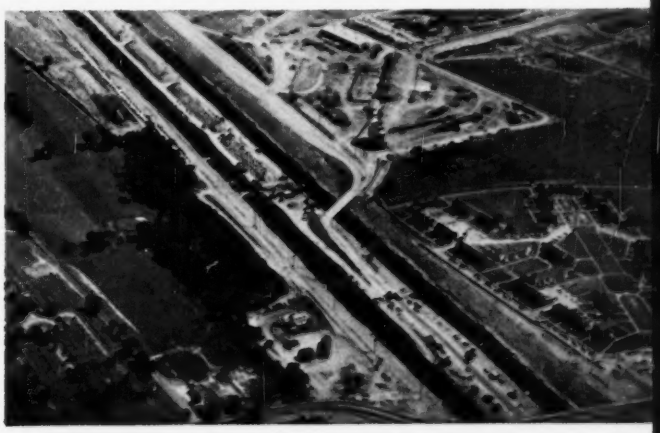
Almost a billion dollars will be spent before the thirteen great turbine-generators of the Niagara Generating Plant start producing power in mid-1962. Before that date arrives, four massive construction projects must be completed, whole villages moved, railroad yards and transmission lines relocated, and a 2,460-acre reservoir dug.

The size of the problems match the size of the project. Everything from Indian rights to tourist convenience has had to be considered by the Project heads. Furthermore, each contractor has special difficulties of his own to face. Merritt-Chapman & Scott Corporation, for example, building the Niagara Generating Plant, has had to push the base of the 1,100 foot plant 300 feet back into the cliff because the river bed drops too sharply to allow for the usual built-out coffer dam. Balf-Savin-Winkelman, with a large section of water-conduit to construct, is blasting through solid rock all the way along its share of the 4-mile project.

4 out of 6 projects are Texaco-lubricated

Texaco lubricants — and the Texaco Simplified Lubrication Plan — are proving their worth on 4 out of the 6 major jobs at Niagara. At the intake, along the conduits, at the reservoir site and at the Niagara Generating Plant itself, just eight Texaco lubricants are doing 100% of the lubricating jobs. This simplification of lube requirements is saving Texaco's contractor customers a signifi-

THE INTAKE, 5 miles upstream from the Niagara Generating Plant, will scoop up 50,000 cubic feet of water with its two harmonica mouths every second it operates at full capacity. Merritt-Chapman & Scott Corp. has a $66-million contract for the job.



THE WATER CONDUITS, 46' wide, 66' deep, stretch 22,000 feet through heavily industrialized area, feature unique hinged arches to counteract rock movement. Merritt-Chapman & Scott and Balf-Savin-Winkelman are tackling major portions.

rock and overburden

cant amount in terms of reduced inventory expense, minimized danger of misapplication and slashed purchasing costs. A Texaco team of engineers was present at all times for consultation and practical service.

These are the 8 Texaco Lubricants on the Project

Havoline Motor Oil
Ursa Oil Super Duty } — for engines

Regal Oil (R&O) — for hydraulic systems and air compressors

Marfak Multipurpose — for chassis, wheel bearings, general grease lubrication

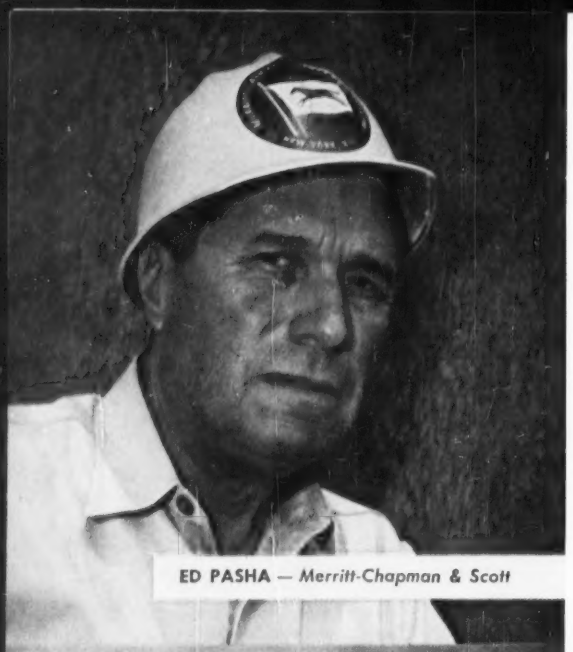
Crater — for wire rope and open gears

Universal Gear Lubricant EP

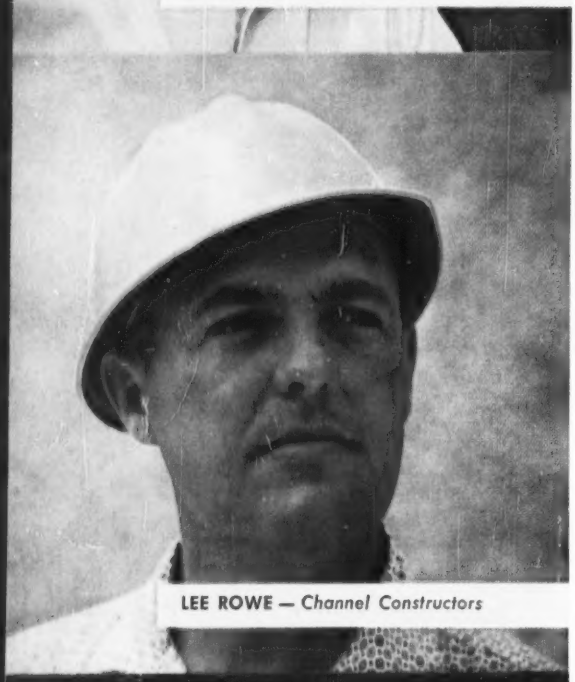
Rock Drill Lubricant

Track Roll Lubricant

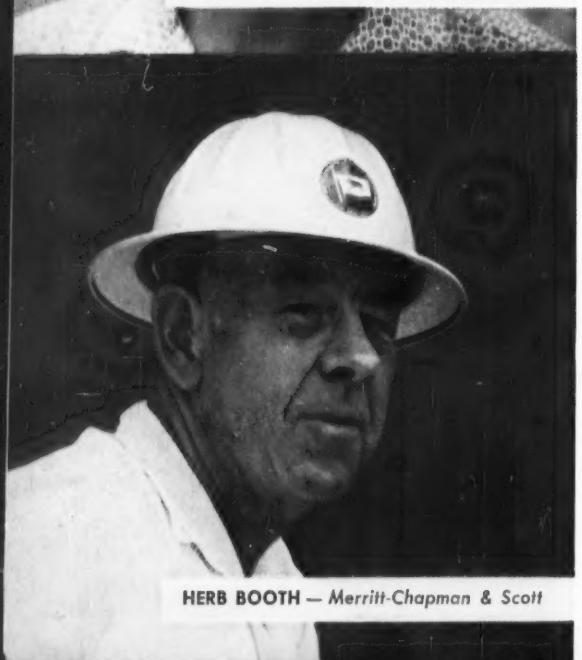
LUBE RIG SPEEDS OPERATION on Niagara job by bringing Texaco lubricants right to the locations where they are needed. With just eight lubricants for the whole job, this contractor can service any piece of equipment with the same rig.



ED PASHA — *Merritt-Chapman & Scott*



LEE ROWE — *Channel Constructors*



HERB BOOTH — *Merritt-Chapman & Scott*

Here's what TEXACO'S customers are doing:

THE INTAKE is a $65,962,254 job assigned to Merritt-Chapman & Scott. Bossed by Ed Pasha, Project Manager, Merritt-Chapman & Scott construction crews are building two harmonica-type intakes each 840 feet long plus a 1000-foot adjoining upstream wall. Before work could be started on the intake structures themselves, Merritt-Chapman & Scott had to build a 3,000 foot cofferdam out into the Niagara River. Other River work will eventually include a 500 foot wide channelization of the bottom for 7,000 feet downstream of the intake structure.

THE WATER CONDUITS will run for about 4 miles through a heavily industrialized area. Balf-Savin-Winkelman, assigned to 9,000 feet of the work, has already finished digging its way through the rock, is now beginning on the bottom slabs.

THE RESERVOIR, assigned to Channel Constructors on a $31,855,000 contract, will cover more than 2400 acres. Lee Rowe, Project Manager, expects to move 9½ million cubic yards of rock and overburden before the job is completed. In addition to the reservoir, Channel Constructors have the job of digging out the open cut part of the waterways system and supplying all the aggregate used on the entire Niagara Project.

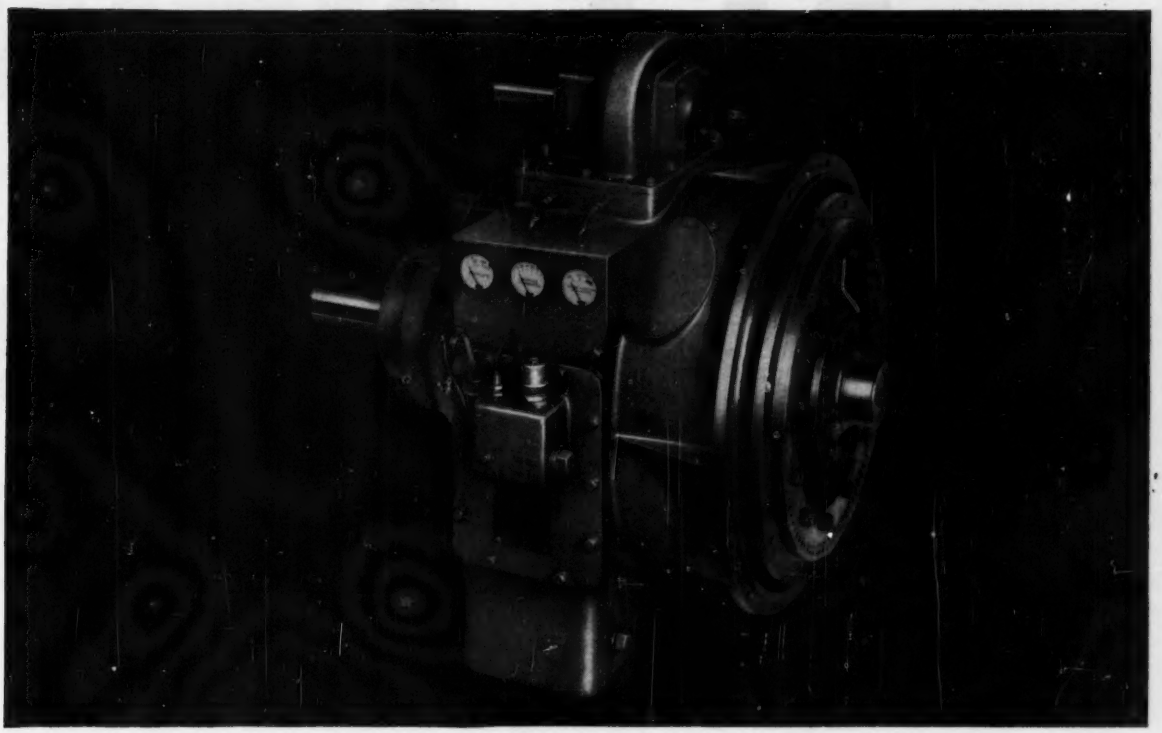
THE NIAGARA GENERATING PLANT at Lewiston is probably the most dramatic part of the Project. Under the direction of veteran project manager Herb Booth, Merritt-Chapman & Scott crews have already carved almost 10 million cubic yards of rock out of the 314-foot cliffs below the Falls. The purpose of this monumental excavation is to provide a platform and spillway 300 feet deep and 1,840 feet long for the 13 huge turbine-generators. When finished the $99,000,000 Power Plant will have an installed capacity of almost 2,000,000 kw.

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

TEXACO

Throughout the United States

Canada • Latin America • West Africa



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Three wheel sizes: 14", 15", 16"

Four power absorption ranges

For engines of 40 to 300 hp

- **Each of these Clark torque converters has self-contained hydraulic circuits. No troublesome plumbing; no oil leakages.**
- **All major components are self-contained, easy to remove, easy to service.**
- **New design eliminates alignment problem between torque converter and engine.**

- **Four output options**
  - **Basic unit less end**
  - **Industrial output (shown)**
  - **Reduction box output**
  - **Five-speed transmission**
- **Many other options**
  - **Disconnect clutch**
  - **Clutch controls: manual, solenoid or air activated**
  - **Overspeed unit**
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  - **Integral governor drives**
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- This series of Clark Torque Converters fits power plants in the 40 to 300 hp range—diesel, gasoline, natural gas, LP gas, electric—intra-city and off-highway trucks, construction machinery, locomotives, farm equipment, logging and oil drilling rigs, ski lifts, industrial drives. All Clark Torque Converters in this series have the same exterior dimensions, all fit SAE No. 1 flywheel housing, SAE type 14" industrial flywheel.

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ALL NEW OLIVER OC-9

—the tractor that TALKS for itself!

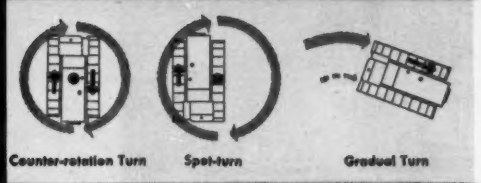
with TRANSOMATIC drive to give you 3 types of turns...fully "powerized" operation!

Wait until you see the size of the *ideas* in this totally modern tractor!

The OC-9 is *all new*, years ahead of anything else its size! It's far advanced in *every* department—in new diesel might with power-boosting torque converter drive...in the easiest operating performance you've ever enjoyed in a tractor.

Being *all* newly engineered and not an updated older model, the OC-9 is designed *in all its components* for more than the full power it packs...for the greater work it can do. In size, weight and strength of torque converter, transmission, clutches, track assembly—*all* vital working parts—the OC-9 is the most massive in its class...the most lasting.

See the progress that has come to tractor design...the profit-multiplying benefits ready for you now!



"Slam-bang test the OC-9 in your own way and let the tractor do the talking"

MOVE INTO THE NEW ERA OF TRACTOR PERFORMANCE

Call your Oliver dealer now for details and demonstration! Or write for brand-new, highly illustrated catalog.

NEW SELECTIVE POWER STEERING

For the first time in a tractor this size, *independent* power to each track gives you three types of *power* turns —for exactly the maneuver the job and conditions call for: counter-rotation turn, spot-turn and gradual turn.

NEW POWER SHIFTING

Shift forward to reverse instantly. No clutching, no gear-clashing, no letup in production! Four speeds forward to 5.94 m.p.h....fastest of all speeds backwards to 7.92 m.p.h.

NEW TORQUE CONVERTER

The OC-9 is the *first* crawler its size having an *industrial heavy-duty* torque converter built far in excess of the toughest work-load requirements. Push or pull twice the pay loads at reduced speeds...profit from its limitless speed ratios to match any job needs.

NEW MASSIVE WORK POWER

Longest and heaviest in its class, the OC-9 delivers the greatest drawbar pounds pull of any tractor its size. Advanced 62 gross h.p. diesel proves its design superiority with higher horsepower per pound...unmatched fuel economy.

NEW OPERATING EASE AND COMFORT

The OC-9's "lap of luxury" controls put easy, relaxed steering and reverse comfortably in hand with conveniently placed, power-assisted controls just ahead of the operator's seat. Only the OC-9 has full-width, flush deck for walk-in ease and leg-movement freedom.

NEW FUNCTIONAL DESIGN

Take a good look at the OC-9's clean, uncluttered good looks. Here is the classic of crawler-engineering with design simplicity and *design sense* sure to enhance your company prestige on every job you give it.

See what's ahead for you in newly achieved job speed—higher-than-ever earnings...

Also All New Oliver 1-Yd. OC-96 Loader

New 100% factory-built loader for the first time incorporates the side pedestals as *integral* parts of the tractor—not high "bolted-on" afterthoughts. No loader parts extend above the engine cowling—for clean-cut, clear-around visibility. Fast-cycle loader with deep-digging and high-reaching range has 1-yd. bucket.

America's fastest loading, fastest reversing 1-yd. loader!

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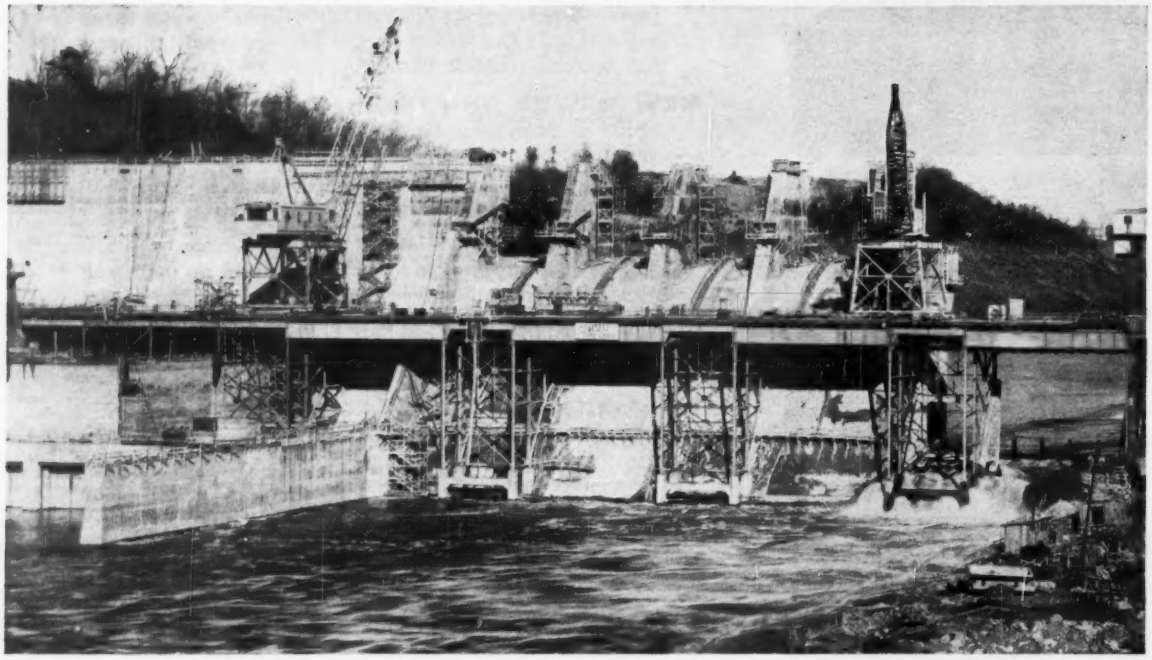


Clyde Whirley No. CW-3264 on Douglas Dam job. Also shown is No. CW-3266, now in use at Widows Creek Steam Plant near Stevenson, Ala.

Performance record of Crane No. CW-3264 shows why

Clyde Whirleys are best for dam construction

The severest appraisal of value of a machine is its record of performance . . . its use and re-use on work for which it has been engineered. Continued re-use over many years writes a record of longevity of useful **and profitable** service such as this record of Clyde Whirley No. CW-3264:

1940 Received new at Cherokee Dam near Jefferson City, Tenn.

1942 Douglas Dam near Dandridge, Tenn.

1943 Fontana Dam near Bryson City, N. C.

1946 Sold. Used at Davis Dam near Kingsman, Ariz.

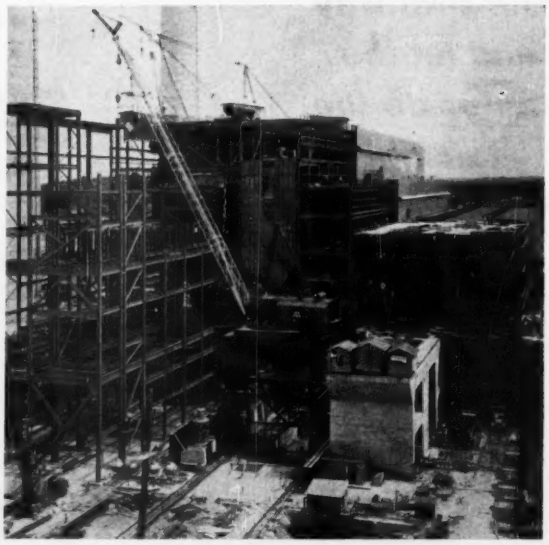
1950 Re-purchased by original owner. Used at Boone Dam near Elizabethton, Tenn.

1952 Fort Patrick Henry Dam near Kingsport, Tenn.

1953 Gallatin Steam Plant near Gallatin, Tenn. through 1959.

1960 Colbert Steam Plant near Tuscumbia, Ala.

Pre-World War II and into the 'sixties'! Repurchased by the original owner! What better recommendation for the quality engineering and rugged and dependable construction of Clyde Whirleys . . . or any other material handling equipment that bears the Clyde trademark?



Clyde Whirley No. CW-3264 at work on the Gallatin Steam Plant. Boom length has been increased to 167'. Gantry has been increased to 62' and will be increased to 95' for Colbert Steam Plant job. Hoist motor size has not been increased.

. . . and No. CW-3264 is still in the prime of its youth!

CLYDE IRON WORKS, Inc.

Established 1899

DULUTH 1, MINNESOTA

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Architects and design engineers who specify open web steel joists will find this 32-page reference manual a convenient time and work saver.

The Steel Joist Institute's new Standard Specifications and Load Tables cover both "S" Series and "L" Series open web steel joists. Here, in one handy source, is all information needed for easy specification of joists to meet all uniform load requirements for spans up to 96 feet.

A copy of the publication is available without charge from the Steel Joist Institute.

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WHEEL SPEEDS: big engine develops 50 HP at only 1250 RPM, drives through main transmission to digging wheel differential; operator has choice of 4 forward wheel speeds, 1¼ to 8 RPM, plus reverse.

CRAWLER TRANSMISSION: this famous Cleveland-exclusive feature provides 12 individual crawler speeds for *each* of 4 wheel speeds, allows operator to choose, from over 30 *usable* combinations of wheel and crawler speeds, the *right* combination of power and speed for every digging condition.

HYDRAULIC STEERING: big 16" x 3" internal hydraulic brakes, controlled by suspended-type foot pedals, provide easy steering and maneuvering of the...

WORLD'S FINEST TRENCHER CRAWLERS: a tremendously long-lived, stable, trouble-free, easy rolling track; 1000-hour lubricated, it employs double-flanged wheels rollers and sprockets with teeth widely spaced, drives on each end of 1½-inch hardened crawler pins.

BOOM HOIST: two easy-acting levers independently control raising and lowering each end of digging wheel boom through full height and depth range.

V CONVEYOR SPEED AND DIRECTION: dual, independent, pulley-enclosed hydraulic drives give operator instant control of conveyor belt speed and direction of discharge, eliminate need of conveyor chains, sprockets, hung-on motors, etc.

V CONVEYOR POSITIONING: operator shifts conveyor hydraulically from side to side, placing spoil wherever desired while digging past trees, poles, etc.

HYDRAULIC CRUMBING SHOE: operator controls raising and lowering of shoe, as required, for lifting or setting digging wheel at walks, driveways, underground obstructions, etc.—an exclusive Cleveland feature which makes crumbing practical even in obstruction-crowded digging.

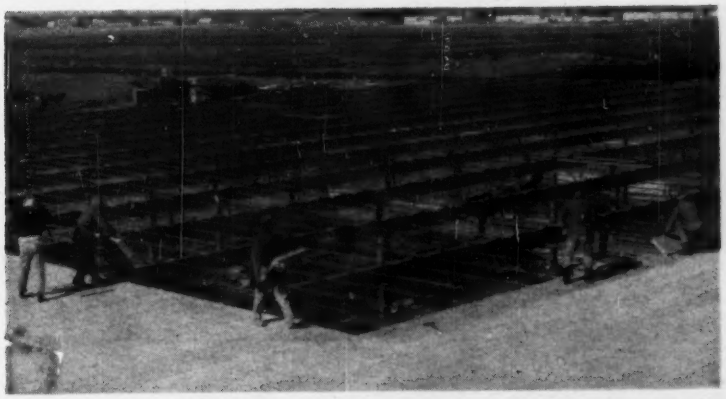
Get the complete story on Cleveland J Trenchers from your distributor

Good Everywhere

The CLEVELAND TRENCHER Co.

20100 St. Clair Avenue • Cleveland 17, Ohio

Job Talk . . .

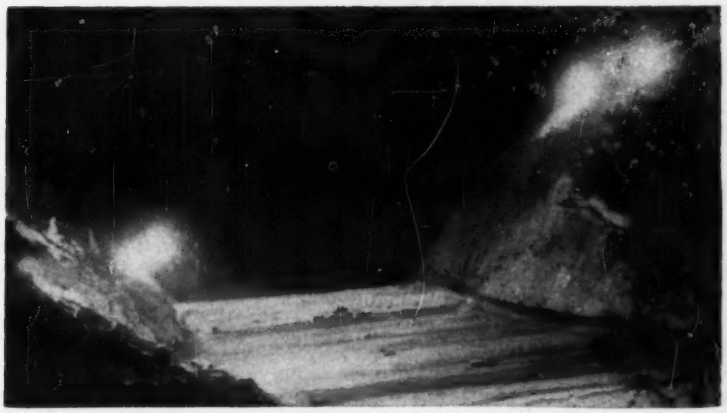


Placing Precast Roof Tiles Goes Fast

Precast concrete tiles covering the 12-acre roof of the Northwest Airlines main overhaul base at Wold-Chamberlain Field in Minneapolis, Minn., go into place so fast that the roof of the building will be completed before the walls. Subcontractor Northern Placing Co. of Minneapolis puts in place as much as 17,000 sq ft of the tiles in a single day.

Each 3-in.-thick vermiculite concrete tile measures 18x36-in. and weighs about 47 lb. Trailer trucks deliver loads of tile to the work area within the giant building, and portable conveyors lift them to workmen on the roof. There crews place them across steel bar joists spaced on 3-ft centers.

A specially designed clip that hooks over the flanges of the joists secures the tiles against uplift. A loop at the top of the clip slips over a section of ¼-in. reinforcing rod embedded in the grout placed in the triangular slot formed by the bevel edges of adjacent tiles.



Floodlights Keep Job Bright at Night

Mounted on steel frames anchored into the rocky slopes of the San Joaquin River Canyon in California, eight banks of floodlights brilliantly illuminate the mammoth earth dam being built by Bechtel Corp. for Southern California Edison.

The 170 General Electric 1,500-watt mercury vapor floodlights permit Bechtel's earthmoving crews to work two 9-hr shifts. Night crews move as much material per machine as the day crews. The floodlights provide illumination over the work area bright enough to allow mechanics to handle equipment maintenance without auxiliary lights.

continued on page 30

HOW TO CUT COSTS

When cutting these tough metals . . .

CONCRETE REINFORCING RODS • EXTRA HARD WIRE ROPE AND CABLE • STEEL MESH • GUY WIRE

HKP®
PORTER
HEAVY DUTY
CUTTER

RUGGED CUTTERS FOR THE TOUGHEST METAL-CUTTING JOBS!

- Heat-treated, drop-forged jaws!
- All-steel handles!
- Available in 5 sizes — Capacities up to ⅝" hard metal!

PLUS — *3 sizes of HYDRAULIC CUTTERS for cutting up to 1⅜" rods.*

STEEL CABLE CUTTERS

- Shear action gives clean cuts on soft or hard steel cable or wire rope up to ¾"!
- Notched jaws lock cable, minimize crushing!

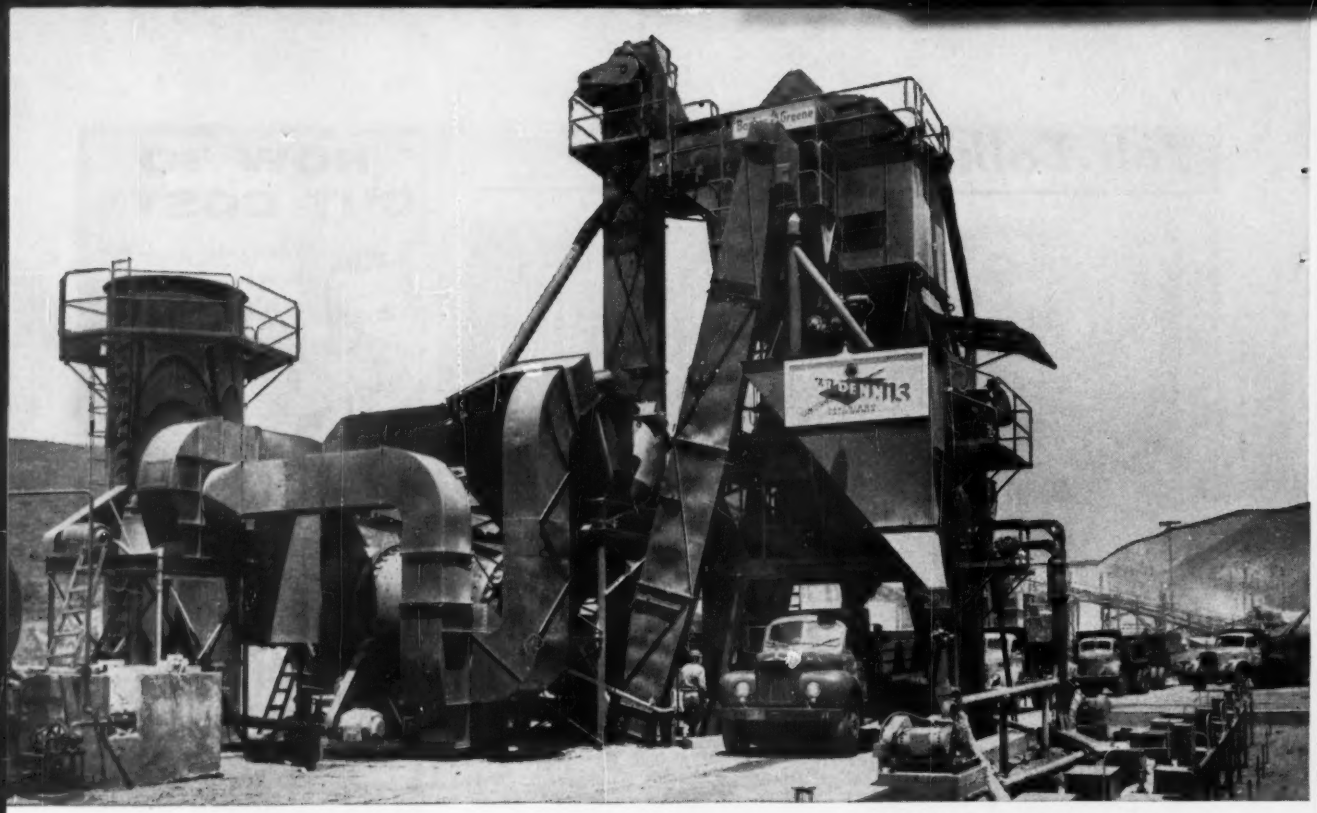
and the NEW PRESTRESSED CABLE CUTTER

For cutting ⅜" and 7/16" prestressed cable. Slotted keepers on jaws hold cable firm and prevent deformation during cut. For cutting cable to desired lengths and after beams are poured.

CUT — up to ¾" rods with HAND OPERATED TOOLS — up to 1⅜" rods and 2½" power cable with POWER OPERATED TOOLS.

Order from your regular supply house or write direct for information!

HKP®
H. K. PORTER, Inc.
Somerville 43, Mass.



BARBER-GREENE BATCHOMATIC PLANT

HOW TO GET TOP FROM YOUR NEW

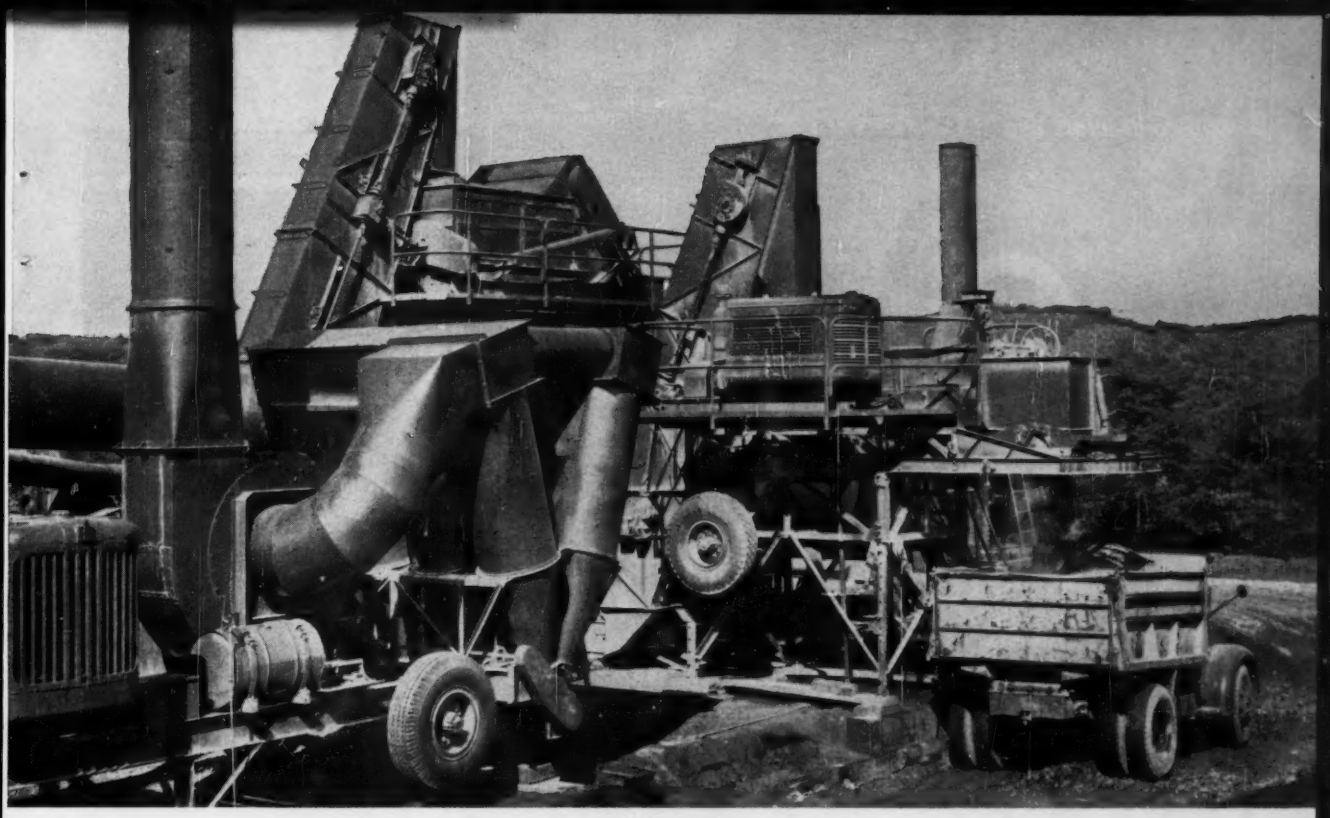
Invest after getting full facts on which of 17 Barber-Greene continuous mix and batch plants is custom fitted to your needs

Before you buy a new asphalt plant, spend a few moments learning whether a continuous mix or batch-type plant can produce the top tonnage and profits for your operating conditions.

And you can be sure of getting full facts on both type plants from the man who sells 17 sizes of continuous mix and batch plants—your Barber-Greene distributor. He does no short line selling, but rather can analyze your operation and pencil out the profit picture on the type plant he recommends.

Should his analysis show a Barber-Greene Continuous Mix plant is your best investment, you get these 10 benefits: 1) up to 10% savings on initial plant costs; 2) sustained high production at lowest per ton cost; 3) up to 10% lower operating costs in horsepower and fuel savings; 4) up to 10% lower maintenance costs per ton; 5) higher resale value; 6) less skilled operators required; 7) continuous preset proportioning accuracy; 8) fastest of any plant average setup time; 9) buy and use only components needed for a specific job; and 10) move and use only components needed for your next job.

Should your operations be best served by your size Barber-Greene BatchOmatic, you get all these exclusive features: 1) only completely new and proved automatic plants—no warmed-over designs; 2) push-button mix changes with no penalty for automatic operation; 3) most rugged and reliable automatic control system cuts downtime in half; 4) greatest production per dollar of plant investment; 5) all movement in new deeper, shorter pug mill is mixing action giving most thorough mixing in less time; 6) fastest discharge from largest pug mill opening plus fast hydraulically activated gate; 7) up to 10% more tonnage hourly with advanced cycling principle; 8) over 25% greater sand screening capacity; 9) completely pre-wired plant is standard equipment; 10) completely hydraulic operation is standard



BARBER-GREENE CONTINUOUS PLANT

TONNAGE, PROFITS
ASPHALT PLANT

equipment—no need of auxiliary air compressor; and 11) plant comes completely assembled in sections for fastest erection, disassembly.

If you need a power control or manually operated batch plant, you can choose from eight equally productive models in the reference chart.

Spend a little time with your Barber-Greene distributor before you buy any asphalt plant. You'll find it's the wisest investment you ever made.

One of these Barber-Greene plants gives you top tonnage, profits

CONTINUOUS MIX		BATCH-TYPE		
Model	TPH Range	BatchOmatic Model	Power Control	Manual Model
840-B	55	2000 lbs.	892...2000 lbs.	890...1000 lbs.
845	90	3000 lbs.	893...3000 lbs.	891...1500 lbs.
847	160	4000 lbs.	894...4000 lbs.	892...2000 lbs.
848-A	250	5000 lbs.	895...5000 lbs.	
		6000 lbs.	896...6000 lbs.	

Only Barber-Greene offers four different finishers plus a new versatile road widener —equipment sized for all your needs.

World's No. 1 Manufacturer of Asphalt Paving Equipment

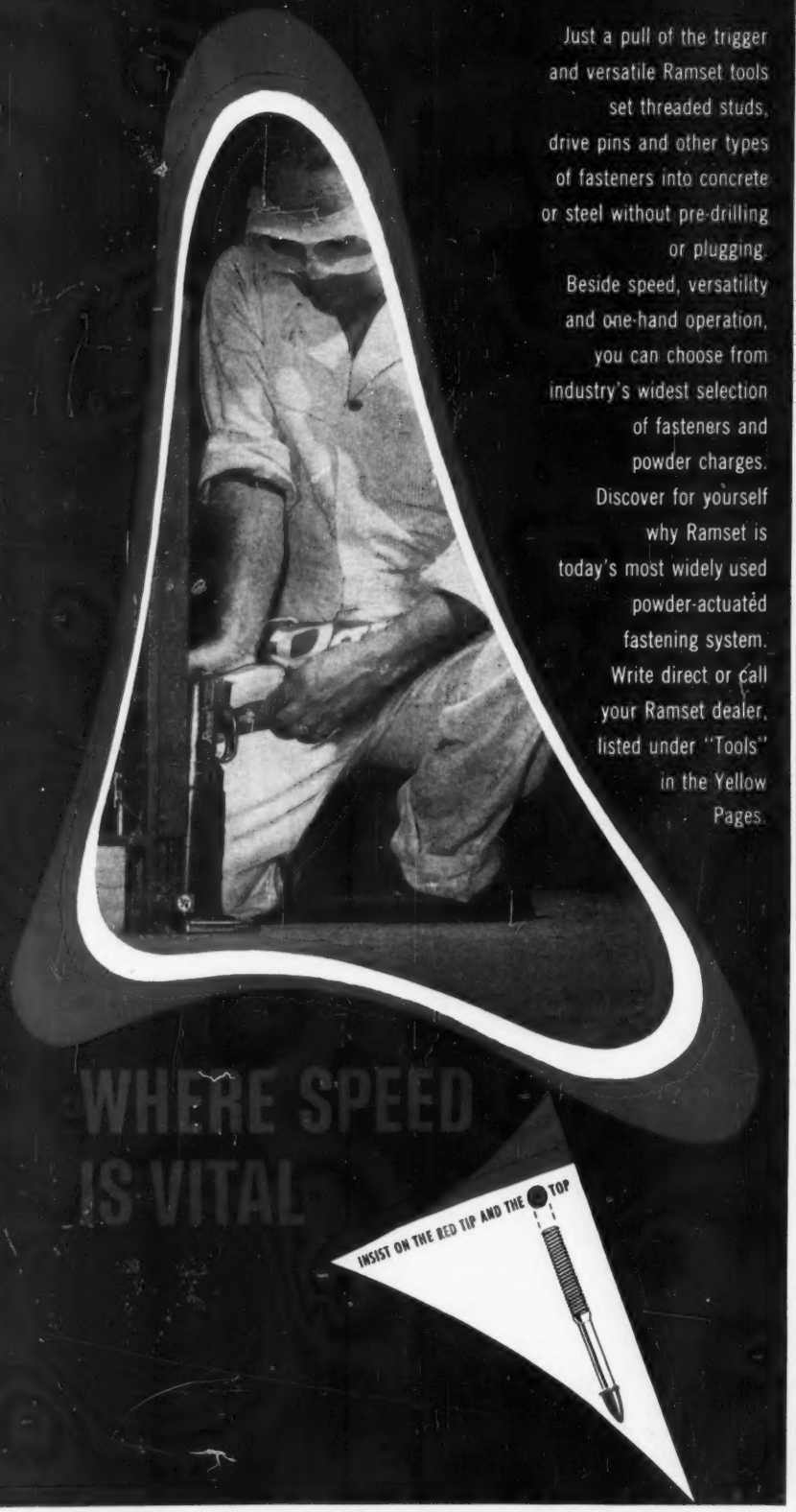
Representatives in Principal Cities of the World

Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.

Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia

leading contractors use **Ramset**



Just a pull of the trigger and versatile Ramset tools set threaded studs, drive pins and other types of fasteners into concrete or steel without pre-drilling or plugging. Beside speed, versatility and one-hand operation, you can choose from industry's widest selection of fasteners and powder charges. Discover for yourself why Ramset is today's most widely used powder-actuated fastening system. Write direct or call your Ramset dealer, listed under "Tools" in the Yellow Pages.

Ramset® Fastening System

OLIN MATHIESON CHEMICAL CORP. · WINCHESTER-WESTERN DIV. · 281-A WINCHESTER AVE. · NEW HAVEN 4, CONN.

JOB TALK . . .

continued from page 27

Old Conveyor Belts Protect Road Surface

A mining firm at St. Genevieve, Mo., has found a good use for discarded conveyer belts. Mississippi Lime Co. lays the belting across a black-top county road that cuts across their work area. It forms a permanent track for heavy construction equipment to cross the road. The belting in no way interferes with normal traffic, but it effectively protects the road surface from damage by crawler treads of equipment.

Keeping a Cool Head

After experiencing severe headaches for several days while wearing his metal safety helmet in the hot sun, Ray Vaught, a foreman with E. E. Barber & Sons of Texarkana, Ark., came up with a cool idea to take the heat off his head. He put a 1-ft-square piece of 3/16-in.-thick asbestos cloth inside his helmet as an insulator.

The marked difference in temperature between a lined and unlined helmet was clearly evident by touch. By strapping a thermometer inside an asbestos-lined helmet, Ray found that the temperature inside was as much as 20 deg cooler than the temperature outside. It wasn't long before everyone on the job had adopted his idea for keeping a cool head.

ENGINEER'S FIELD REPORT

PRODUCT: RPM TRACTOR ROLLER LUBRICANT

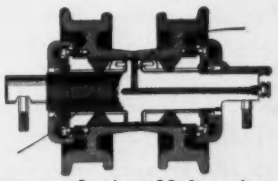
FIRM: THOS. SCALZO CO. Seattle, Washington

Just 3 new track rollers in 4 years' tough service

Granite Boulders put a real strain on track rollers, but this Allis-Chalmers HD20, using RPM Tractor Roller Lubricant, A/C Type, has replaced only three rollers in four years of working under such punishing conditions. Tractor is operated by Thos. Scalzo Co., specialists in earth-moving projects. RPM Tractor Roller Lubricant gives this operator an average life of 3,000 hours for track rollers on equipment in heavy-duty service. After 3,000 hours, rollers are switched to equipment in lighter duty service.

Pulling a Grid Roller, this Caterpillar D8 tractor is another of Scalzo Co.'s 14-tractor fleet—all of which use RPM Tractor Roller Lubricant. Says Vic Scalzo, "In spite of rough service under all kinds of conditions, in 15 years we have never had to replace a track roller because of lubricant failure. Our on-the-job experience and our service records prove that RPM Tractor Roller Lubricant has been doing a good job for us since we started using it in 1941."

How RPM Tractor Roller Lubricants resist wear in toughest service



- Flow evenly to all bearing surfaces—retard rusting.
- Chemical agents maintain tough lubricating film and stability.
- Additive materials keep lubricant on bearings, resist leakage, helps form protective seal for bearings.
- Lubricants meet specifications of all tractor manufacturers.

For More Information about this or any other petroleum product, or the name of your nearest distributor, write or call any of the companies below.

AUTOMOTIVE LUBRICANTS RPM

TRADEMARK "RPM" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS; El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

WHAT'S BEHIND THE BIG SWITCH TO

here are the real reasons why you see more *and* more MANITOWOCS *on jobs everywhere*

No doubt *you* have noticed the swing to Manitowoc — on highway jobs, building construction, trenching work, dam projects — on jobs big and small in every state. Never before has Manitowoc offered as complete a line of big capacity shovels and cranes tailored to match the rocketing growth of heavy construction. In every size range, on crawlers or rubber, Manitowoc machines will help you meet the challenge of the Sixties! Now . . . check these facts behind the big switch.

SIMPLE, MONEY-SAVING DESIGN puts you yards ahead in output — dollars ahead on your balance sheet. The exclusive Manitowoc slide pinion design allows you to channel engine power directly and selectively only to desired operating functions . . . by-passing those not needed. There are fewer moving parts, requiring less maintenance, and providing a full surge of direct-line power.

FASTER CYCLE SPEED with responsive disc-type swing clutches, fast-acting brakes, and smooth torque converter drive. Rapid swings, hoists, and travel (even up 30% grades) speed the work on any type of job to finish out contracts ahead of time.

INSTANT-TOUCH CONTROL for precise lift work and accurate spotting over haul units. Plunger activated drum clutches can be slipped or locked in place, even with drums reversed. Air controls make excavator operation easy on the shovel runner.

RESERVE-POWER — RESERVE CAPACITY. Because of Manitowoc's unique, "Power-flo" design, the engine is never straining — always has a reservoir of power available. And every model is ready to put out bonus capacity if needed.

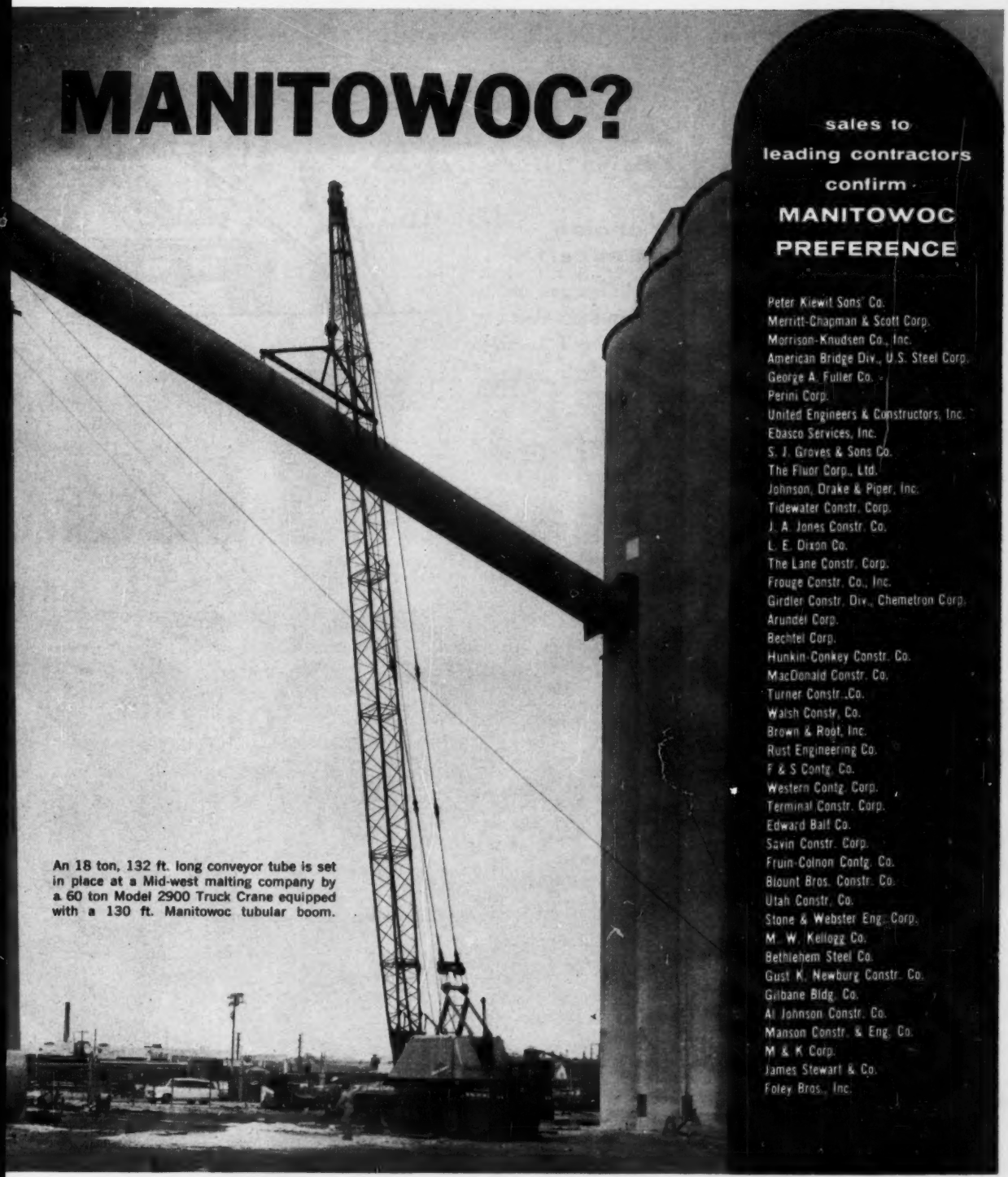
EXTRA STRENGTH AND LONGER LIFE IN EVERY PART due to selective use of the best available materials for each specific component. Both shovel and crane booms are engineered to take the toughest jobs in stride. Huge, one-piece carbodies hold their shape forever — keep the entire machine in permanent alignment.

UNMATCHED CAPACITY RANGE on crawlers or rubber. Now you can choose a Manitowoc that will perfectly match *your* operation. The Manitowoc line is bigger than ever — ranging from a 1¼-yd. excavator to the world's largest crawler-type lift crane . . . the 125 ton Model 4000. Study the chart below, then contact your Manitowoc distributor for full information on the machine that will put you way ahead of your competition!

LOOK WHAT MANITOWOC *OFFERS FOR 1960!*

	NINE CRAWLER MACHINES									THREE ON RUBBER			
MODEL	2000	2300	3000	3100	3400	3600	3900	4000	4500	MODEL	2800	2900	3500TC
SHOVEL	1¼ YD.	1½ YD.	...	2½ YD.	2½ YD.	3 YD.	...	...	6 YD.	CRANE	45 TON	60 TON	80 TON
CRANE	25 TON	35 TON	50 TON	50 TON	65 TON	65 TON	80 TON	125 TON	100 TON	...	...	...	...
DRAGLINE	1¼-1½ YD.	1½ YD.	...	2½ YD.	...	3 YD.	3-3½ YD.	...	6 YD.	...	...	...	...
TRENCH HOE	1¼ YD.	1½ YD.	...	2½ YD.	2½ YD.	3 YD.	...	...	...	...	...	...	...

MANITOWOC?



An 18 ton, 132 ft. long conveyor tube is set in place at a Mid-west malting company by a 60 ton Model 2900 Truck Crane equipped with a 130 ft. Manitowoc tubular boom.

sales to leading contractors confirm MANITOWOC PREFERENCE

Peter Kiewit Sons' Co.
Merritt-Chapman & Scott Corp.
Morrison-Knudsen Co., Inc.
American Bridge Div., U.S. Steel Corp.
George A. Fuller Co.
Perini Corp.
United Engineers & Constructors, Inc.
Ebasco Services, Inc.
S. J. Groves & Sons Co.
The Fluor Corp., Ltd.
Johnson, Drake & Piper, Inc.
Tidewater Constr. Corp.
J. A. Jones Constr. Co.
L. E. Dixon Co.
The Lane Constr. Corp.
Frouge Constr. Co., Inc.
Girdler Constr. Div., Chemetron Corp.
Arundel Corp.
Bechtel Corp.
Hunkin-Conkey Constr. Co.
MacDonald Constr. Co.
Turner Constr. Co.
Walsh Constr. Co.
Brown & Root, Inc.
Rust Engineering Co.
F & S Contg. Co.
Western Contg. Corp.
Terminal Constr. Corp.
Edward Balf Co.
Savin Constr. Corp.
Fruin-Colnon Contg. Co.
Blount Bros. Constr. Co.
Utah Constr. Co.
Stone & Webster Eng. Corp.
M. W. Kellogg Co.
Bethlehem Steel Co.
Gust K. Newburg Constr. Co.
Gilbane Bldg. Co.
Al Johnson Constr. Co.
Manson Constr. & Eng. Co.
M & K Corp.
James Stewart & Co.
Foley Bros., Inc.

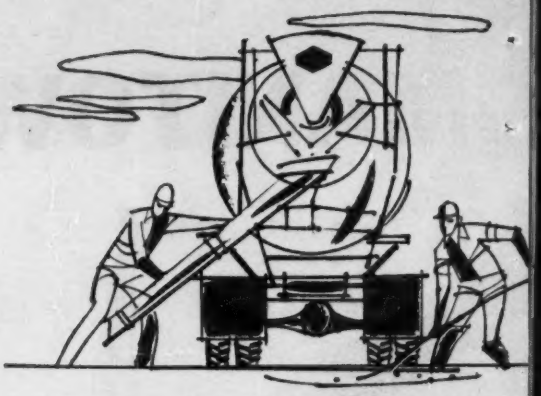
Manitowoc

MANITOWOC ENGINEERING CORP.

(A Subsidiary of The Manitowoc Company, Inc.)

Manitowoc, Wisconsin

SHOVELS	CRANES	DRAGLINES	TRENCH HOES
1¼ — 6 YDS.	25 — 125 TONS	1¼ — 6 YDS.	1¼ — 3 YDS.

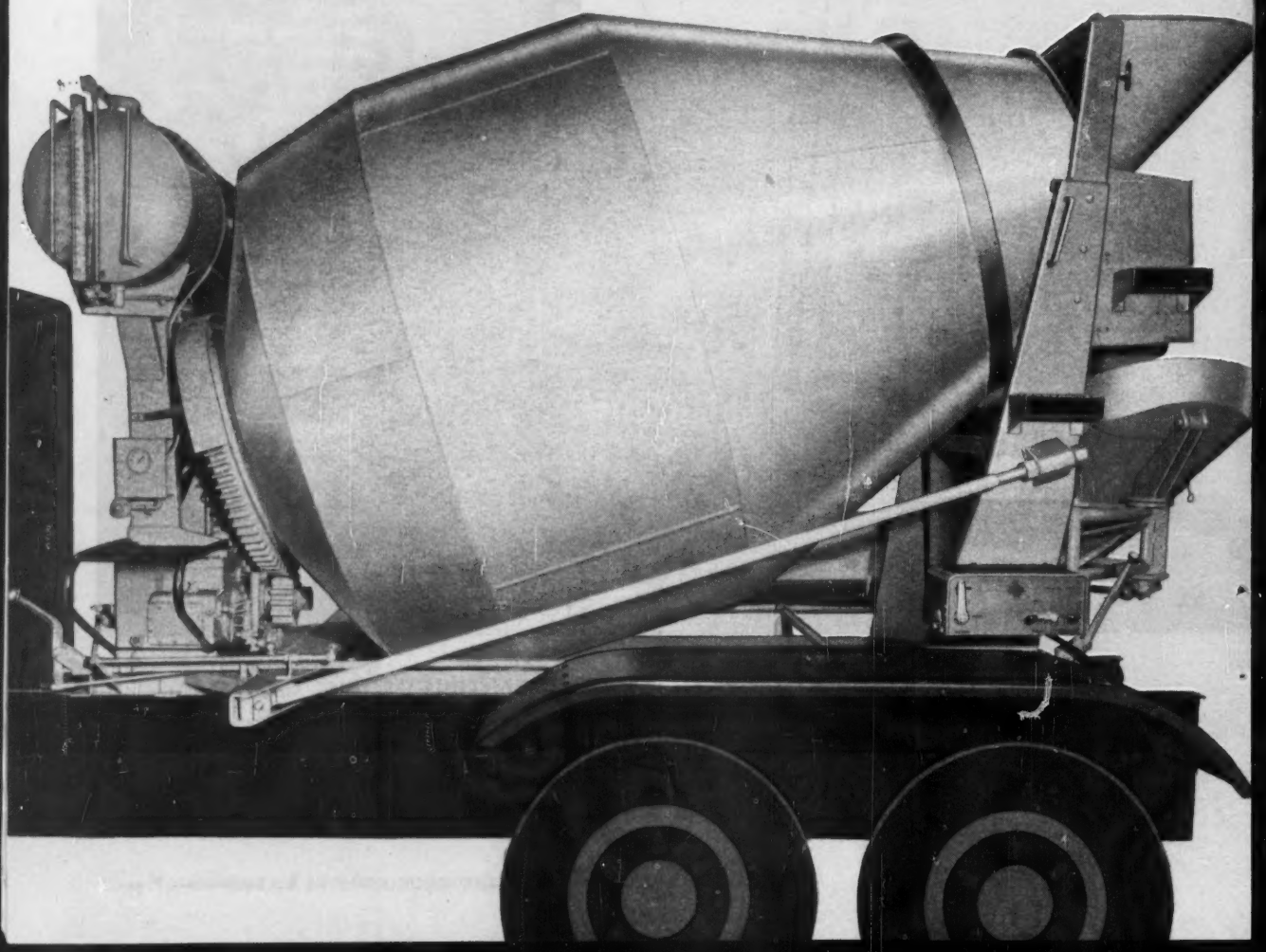


Featuring the greatest choice of options on any truck mixer!

Smith puts you in the driver's seat . . . lets you specify the best design for your operation from the widest choice of options—many available *only* from T. L. Smith:

- Gear or chain drive
- Separate engine, gasoline or diesel power
- Fly-wheel take-off or front power take-off
- Gear ratios to match your truck
- Full frame or unitized truck-and-mixer frame
- Optional drum thickness
- Flush, pressure, or two compartment tanks
- Front, rear, or dual piping
- Inexpensive, trouble-free mechanical cab control
- Standard 12'6" deep-dished chutes, paving chutes with 4" added width, or new lightweight aluminum chutes and extensions.

THE



After 1½ years of thorough field-testing,
a new *proved* advance in truck mixer design!

NEW SMITH

TAILORED TO *YOUR* OPERATION!
Smith tailor-makes this mixer to suit your choice of truck, your type of power, and your particular ready-mix operation.

HIGH-STRENGTH DESIGN!
Ultra-sturdy frame uses torsion-bar principle . . . strengthens, instead of stresses, the truck frame . . . eliminates misalignment and distortion.

GREATER LEGAL PAYLOAD!
Lightweight, shorter design provides better weight distribution, permits increased payload without violating legal load limits.

EASIER OPERATION!
New rugged transmission uses multi-disc duplex clutch running in oil — and provides *single-stick* control of all drum functions: clutching, high-low speed, mixing, and discharge.

LESS MAINTENANCE!
Transmission is built to aircraft specifications — far stronger than automotive mixer transmissions, and with correspondingly greater operating life.

Constant frame alignment assures reduced wear on drive components — longer chain or gear life.

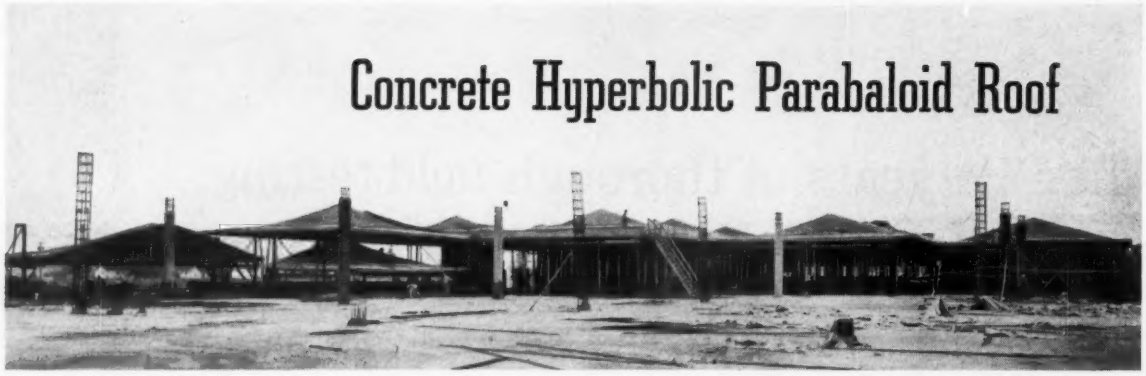
AND FEATURING THE FAMOUS SMITH DRUM!
Unchanged, because test after test proves it is still the world's fastest-charging, best-mixing, and fastest-discharging truck mixer. Anti-spill design carries up to 1 yard more concrete per load than any other mixer!

THE NEW SMITH MIXER IS AVAILABLE NOW—
See your T. L. Smith distributor for a demonstration!

SMITH

THE T. L. SMITH COMPANY
Milwaukee 1, Wisconsin • Lufkin, Texas
Affiliated with Essick Manufacturing Company, Los Angeles, California

Concrete Hyperbolic Parabaloid Roof



Partially completed fireproof shopping center. Each of the 44 umbrella units is 48'6" x 46'3" and is supported by a single column. The completed building is 196' x 511'.

Provides Large Unobstructed Floor Areas

At Bloomington, Minnesota, this new shopping center has been completed employing a very modern concrete hyperbolic parabaloid roof design—the first of its kind in the Minneapolis area. This type of roof design for single story structures provides large unobstructed floor areas at low cost.

Contractor planning on the job was precise. Careful scheduling and the use of Lehigh Early Strength Cement made it possible to strip and re-use the unique concrete form system in less than half the time which would have been required with regular cement. Only four sets of forms were needed. Eight units—or bays—were poured per week.

This is another example of the advantages of Lehigh Early Strength Cement and modern concrete construction. Lehigh Portland Cement Company, Allentown, Pa.

LEHIGH CEMENTS

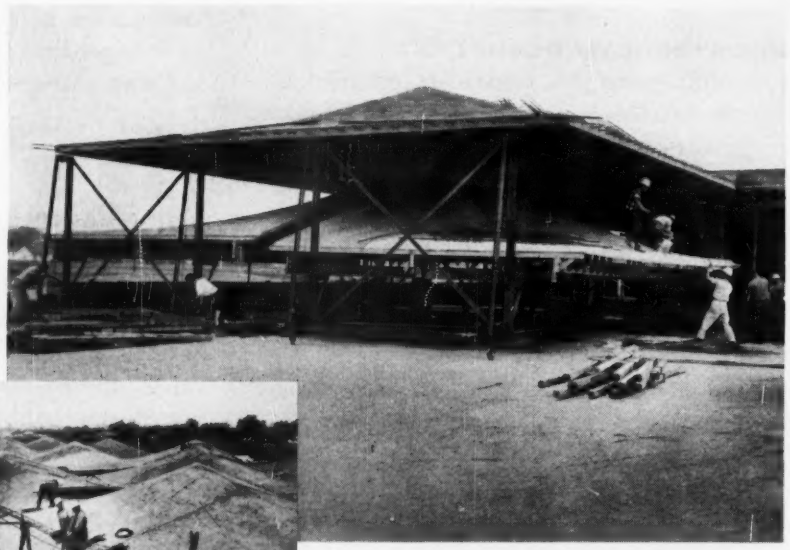
Owner: Bloomington Development Co., Bloomington, Minn.

Architects: Manuel Morris & Robert E. Sixta Assoc., Kansas City, Mo.

Structural Engr.: Dutton Biggs, Kansas City, Mo.

Contractor: George Madsen Construction Co., Minneapolis, Minn.

Ready Mix Concrete: Twin City Ready Mix Concrete Co., Minneapolis, Minn.



As set of forms is lowered, workmen place supplies of reinforcing on it. Form serves as elevator to carry bars to roof for assembly. Each half of the form weighs 4 tons. Four sets of forms were used cyclically for an efficient construction schedule.

Other workmen prepare reinforcing for more roof sections on top of completed concrete "dunes." Concrete shell is 3" thick.

NEW!
30-YD CAPACITY

ALLIS-CHALMERS TS 360

Everything you'd want in a big scraper... if you were building it for your own big jobs.

New 30-yard capacity . . . backed by 340 turbocharged horsepower . . . gives you big-volume production that will match or surpass anything you've seen in over-all performance.

You've got the size . . . the power . . . the durability to tackle any size job . . . from I-System dirt to the biggest dams . . . from king-size housing developments to big state highway jobs.

From radiator grille to push block, the new *360* gives you more dirt-moving features than any other big scraper: high-torque engine characteristics and snappy acceleration . . . full 90-degree steering . . . new steering and scraper control that mean new standards of big scraper performance.

Look at it from your viewpoint . . .

NEW STANDARDS OF

Plus the exclusive advantages of KON-TORK differential... a combination

The new TS-360 offers all-hydraulic performance... constant, double-acting hydraulic power and an independent steering system.

The TS-360 brings you KON-TORK differential—torque-proportioned traction that really provides all-weather performance . . . plus the time-saving advantages of smooth, controlled spreading.

So whether you're speeding away from the pusher or duck-walking through a soft fill, you'll find that the new TS-360 performs more dependably, day after day, than any other big motor scraper.

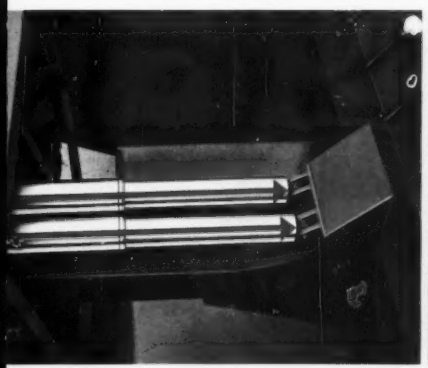
Positive penetration at cutting edge
This demonstrates the TS-360's tremendous penetrating force. See how the *360* puts enough pressure on the cutting edge to pivot the scraper *and its load* clear of the ground.

ALLIS-CHALMERS TS 360

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

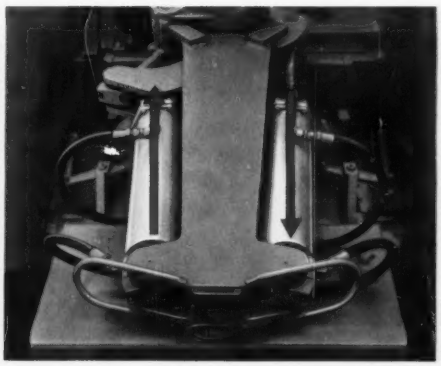
ALL-HYDRAULIC PERFORMANCE!

that means extra profit capacity for you...loading, hauling and spreading.



Double-barreled dump power

Twin telescoping cylinders provide powerful forced ejection in three progressively faster stages. Even chunky material is ejected quickly, cleanly without "pumping" tailgate.



Push/pull steering power

Double-acting steering jacks fed by an independent hydraulic system assure steering power to match any situation . . . more power in full 90° position than other units offer straight on.

Steady torque, positive traction

KON-TORK differential automatically controls the distribution of torque to the drive wheels. The result . . . maximum traction to match any working condition.

KON-TORK is an Allis-Chalmers trademark.

EVERYTHING YOU'D WANT IN A BIG MOTOR SCRAPER

Turbo-charged 340 hp Allis-Chalmers Diesel Engine

30 cu. yds. heaped, 22.3 cu. yds. struck

Speeds to 26.3 mph... 5-speed transmission

Empty weight—63,150 lb.

- KON-TORK differential
- Two-way hydraulic steering
- Full 90° steering . . . 180° turn in 35 ft. 8 in.
- Double-acting hydraulic bowl jacks
- Double-barreled hydraulic ejection
- 10 ft. apron opening . . . highest in the business
- Outstanding flotation . . . giant size tires . . . and equal weight distribution on all four wheels when loaded

Get the full story on the all-new, all-hydraulic TS-360 from your Allis-Chalmers dealer now!

move ahead with

ALLIS-CHALMERS

...power for a growing world

To shorten protection time up to 50%

COURTESY OF CAISMAN CO., A LEADING MICHIGAN READY-MIX PRODUCER

...order SOLVAY CALCIUM CHLORIDE in your ready-mix!

Your ready-mix supplier can help you keep your *winter* production close to *warm* weather working schedules. Order "Special-Winterized" mix, specifying 2% Solvay® Calcium Chloride*, heated water and aggregate.

You'll benefit these eight ways:

(1) Less overtime finishing–faster set. (2) Faster form removal–high early strength. (3) Savings in protection time–up to 50%. (4) Less delay between operations. (5) More safety through extra cold weather protection. (6) 8-to-12% greater ultimate strength. (7) Increased workability. (8) You use *less* water and you get denser concrete–more resistant to moisture and wear.

Allied Chemical

SOLVAY PROCESS DIVISION
61 Broadway, New York 6, N. Y.

SOLVAY branch offices and dealers are located in major centers from coast to coast.

For full details, mail the coupon for your copy of Solvay's 38-page booklet, "The Effects of Calcium Chloride on Portland Cement." It presents the results of tests of calcium chloride in standard portland cement mixes, cold weather concreting, special cements and major compounds of portland cement. Text is non-technical, and abounds with easy-to-follow tables, graphs and charts.

*Speeds but does not change the basic action of portland cement. This use of calcium chloride is approved by Portland Cement Association, American Concrete Institute, Calcium Chloride Institute, leading highway departments.

SOLVAY PROCESS DIVISION 65-10
Allied Chemical Corporation,
61 Broadway, New York 6, N. Y.

Please send without obligation Solvay's 38-p. booklet, "The Effects of Calcium Chloride on Portland Cement."

Name_____

Position_____

Company_____

Phone_____

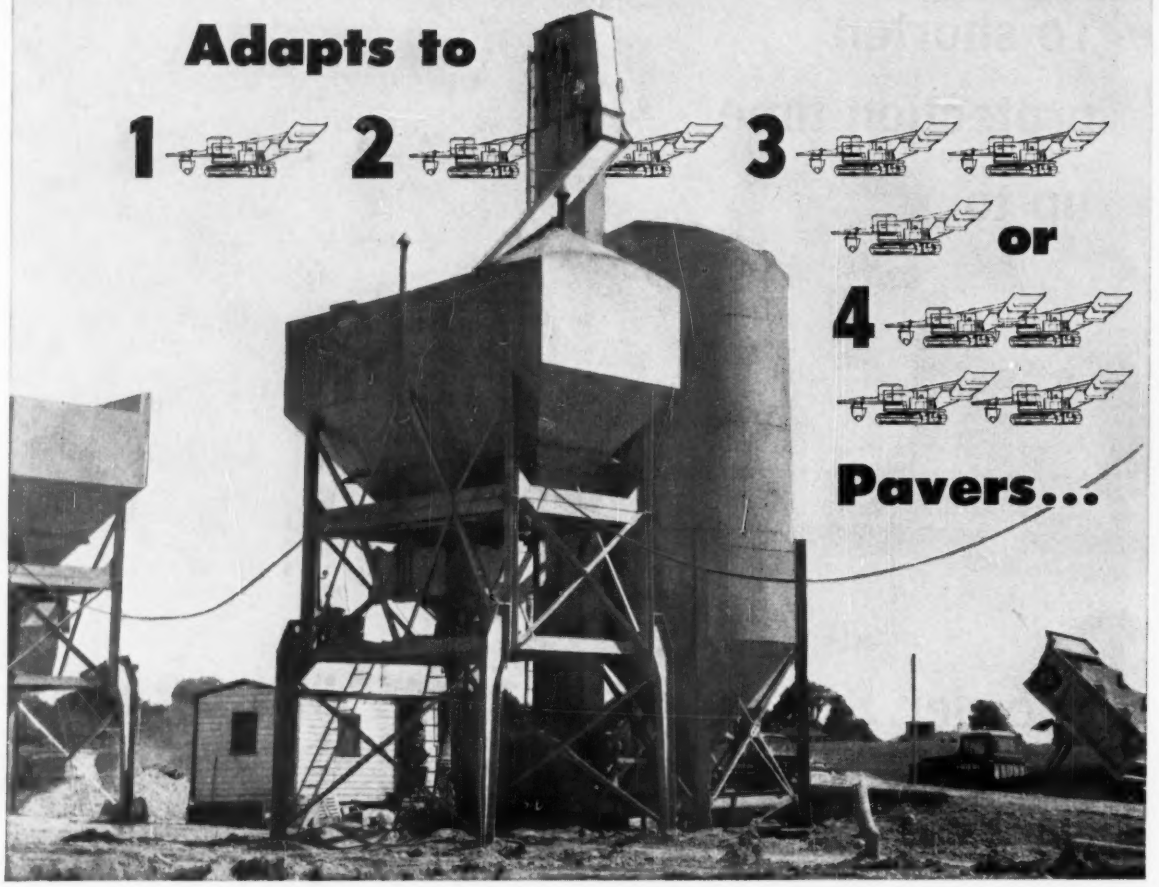
Address_____

City_____ Zone____ State____

The BUTLER TX-4 Roadbuilder's Plant

Adapts to

1 2 3 or 4 Pavers...



So What's the Problem in Making Your Choice of Batching Equipment?

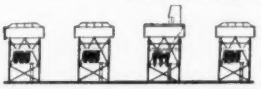
Start with a One Paver Set-up . . . Expand Your TX-4 as You Grow

The basic TX-4 provides two TX-4 bins, one compartmented for cement and sand, the other for two sizes of stone. This easily handles one or two dual drum pavers.

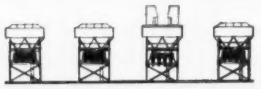
Then for three pavers, simply add two more bins with batchers.

And for four dual drum pavers, just add a batcher to each of the four bins. It's as simple as that. The diagrams at the right tell the story.

1 AND 2 PAVERS



3 PAVERS



4 PAVERS

The TX-4 . . . Simplest and Fastest to Erect, Dismantle and Move

Bin section is complete, ships and erects in one piece. Batcher section also is complete, erects as a unit. All piping and wiring are in-place. Quick connectors for air and current make hook-up a matter of minutes.

So buy a plant of adequate expandability — and avoid going through the bother of trade-ins, delivery delays and awkward, costly time-consuming moves from job site to job site. Settle your problems now, once — and for all — with a BUTLER TX-4.

Do you want to know more about the Butler TX-4 and its versatility in production? Just write "TX-4" on a postcard with your name and address. We'll rush complete details immediately.

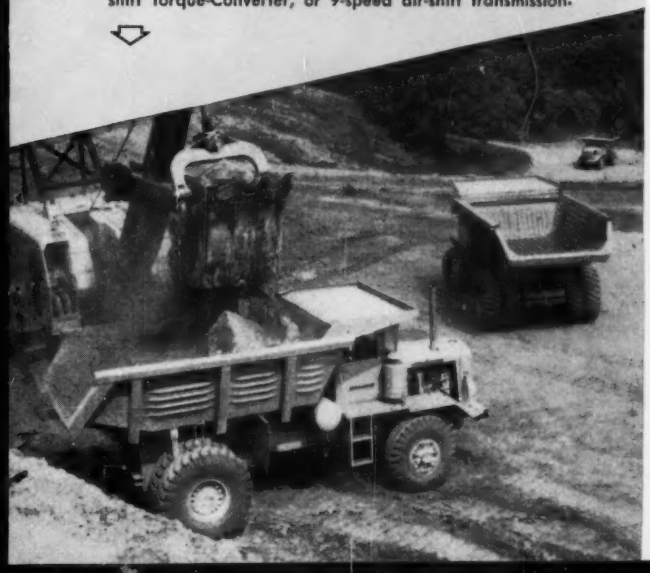
BUTLER BIN COMPANY

949 Blackstone Avenue • Waukesha, Wisconsin

3091

Now "trade" dead weight for payload..and haul 40% faster!

Heap-load the big-target Payhauler body in minimum time. Strong rock-ribbed corrugations absorb shock—resist wear and distortion. Choose the "95" with power-shift Torque-Converter, or 9-speed air-shift transmission.



New strength-multiplying corrugated body design results in payload-gaining weight reduction of both International Payhauler models. New "95" capacity is increased to 27 tons—and the new "65" becomes the only 19-tonner on the market!

Look at those exclusive, rock-ribbed body corrugations! International applies this strength-multiplying principle to reduce Payhauler® body weight by an amazing 30%! You "trade" 2½ tons of power-wasting dead weight for 3 bonus tons of payload capacity in the new 95 Payhauler!

New high-torque, high-output diesel power highballs 27-ton payloads up to 40% faster than the former "95" could haul only 24 tons! The new 375 hp DT-817 International diesel engine gives the new 95 Payhauler the wallop of 40 extra turbocharged "horses."

Prove to yourself that top load-carrying capacity plus top power-to-weight ratio give 95 Payhaulers tremendous profit-earning advantages. Add up other big Payhauler exclusives: fast reverse, up to 7.1 mph. for spotting speed; big-target bodies for loading zip; 11-second inverted-hoist dumping; load speeding safety of torqmatic braking and positive power-steering! Let your International Construction Equipment Distributor demonstrate!

International® Construction Equipment

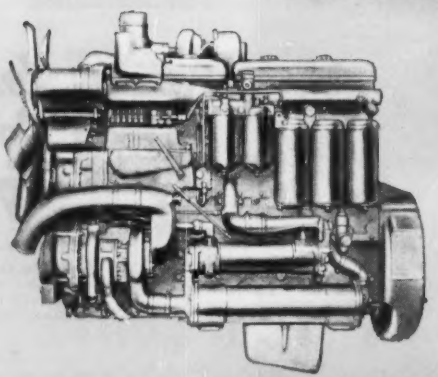
International Harvester Co., 180 N. Michigan Ave., Chicago 1

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors ... Self-Propelled Scrapers and Bottom-Dump Wagons ... Crawler and Rubber-Tired Loaders ... Off-Highway Haulers ... Diesel and Carbureted Engines ... Motor Trucks ... Farm Tractors and Equipment

Keep full loads on the move full time with exclusive Planet Power-steering. Full power on both tracks, *full time*, is the answer! And Hi-Lo on-the-go power-shifting lets you match power to condition, instantly, and keep the yard-boosting advantage of uninterrupted momentum.

You speed-up all four steps of the push-loading cycle with TD-25 torque-converter and planetary system teamwork! 1) You slow down by power-shifting down and using decelerator to get feather-touch contact; 2) power-shift either track up or down to maintain solid pusher contact on curves; 3) get gear-higher kick-outs, with on-the-go power-shifting; 4) reposition faster, with higher-than-ordinary reverse! Two "25s" tandem-pushing the International 295 Payscraper®, and the third, scarifying, belong to contractor Ed Bentley, Sylacauga, Alabama — building superhighway near Birmingham.

PLANET Power-steering... HI-LO power-shifting... COME AS standard equipment ONLY in the new TD-25



The International DT-817 engine—single power source used in both *pushers* and *scrapers*—an *industry first* in power standardization. You'll find this big new direct-start, 6-cylinder turbocharged diesel powering the full line of International two and three-axle Payscrapers; Paywagons®; and end-dump Payhaulers.® *Plus* the new TD-25! Dual valving of this high-torque, 230-hp power plant provides for peak turbocharging efficiency, to develop full power from sea level to timberline!

As standard equipment at no extra cost, the new 230-hp TD-25 gives you the International®-proven control combination that has been beating king-sized clutch-steered crawlers in yardage for years!

You get combined Planet Power-steering and Hi-Lo on-the-go, power-shifting exclusively in the new International TD-25. And you get this basic, built-in design advantage in your choice of torque-converter or synchromesh model!

With this and all its other big advantages, the TD-25 can outearn other big rigs up to 50%—on push-loading; and pulling big drawbar tools such as shale-shattering scarifers!

No "dead-track drag" or "gear-shift lag"! Planet Power-steering gives you full-time "live" power and traction on both tracks, to make full-load turns—and to eliminate load-limiting "dead-track drag." And Hi-Lo on-the-go power-shifting instantly matches power to conditions to prevent load-losing "gear-shift lag."

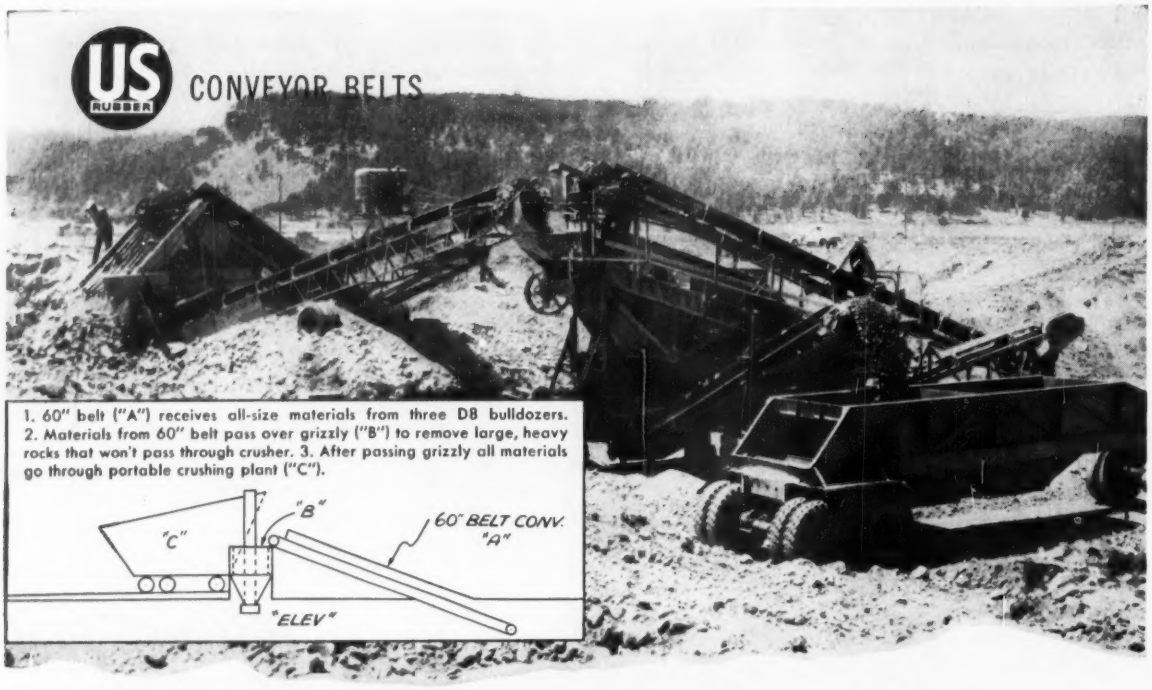
Hi-Lo power-shifting makes the TD-25 the industry's only 4-speed torque-converter crawler and the only one with load-matching efficiency-range control. In the synchromesh transmission "25," the Hi-Lo planetary system gives eight speeds forward and reverse—with cycle-speeding, up-or-down, on-the-go power-shifting with "finger-tip" ease!

Power-shift and power-steer the new "25" with full king-size loads—around curves, upgrade, anywhere. Prove what it means to command full-time, full-load ability to outearn clutch-steered king-sized crawlers, up to 50%. Measure all the "25's" standard equipment extra value features! See your International Construction Equipment Distributor for a demonstration!

***International®* Construction Equipment**

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom-Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.


US RUBBER
CONVEYOR BELTS
1. 60" belt ("A") receives all-size materials from three D8 bulldozers. 2. Materials from 60" belt pass over grizzly ("B") to remove large, heavy rocks that won't pass through crusher. 3. After passing grizzly all materials go through portable crushing plant ("C").
"C"
"B"
60" BELT CONV. "A"
"ELEV"

Conveyor equipped with U.S. Matchless Belt increased production from 175 tons to 300 tons per hour

Such records as this have made U.S. Rubber the world's largest producer of conveyor belts.

In this instance the "U.S." Belt helped increase production at the Carlson-Lien Company (Piedmont, S.D.), a supply firm currently producing road-building crushed rock and delivering it to highway projects. The belt is 60" wide, 35 feet from center to center (78 feet overall). "Our intention," says Bruce Lien, company secretary-treasurer, "is to replace all belts with U. S. Rubber Belts."

In this operation, bulldozers push the rocks to be processed into the loading point. The conveyor belt then carries this material to the grizzly. The belt was designed to withstand direct loading by bulldozers. The impact of the large rocks falling directly on the belt does not damage the conveyor system. This permits the grizzly to be placed at the discharge end of the conveyor instead of at the feed point as in conventional installations.

The superiority of this belt not only helped speed up and increase production, but also eliminated the need for three or four men to laboriously remove large rocks that would damage a belt of inferior quality. The "U.S." Belt proved so efficient in tons moved per hour that another bulldozer was added to keep the loading pit stocked with raw materials. "The belt will pay for itself on this one job. We recommend it to anyone," says Bruce Lien.

• • •

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Close-up of 60" U. S. Matchless® Belt carrying rocks from raw material pit up incline to crusher.

This installation was handled by "U.S." Distributor W. S. Nott, Minneapolis

US RUBBER

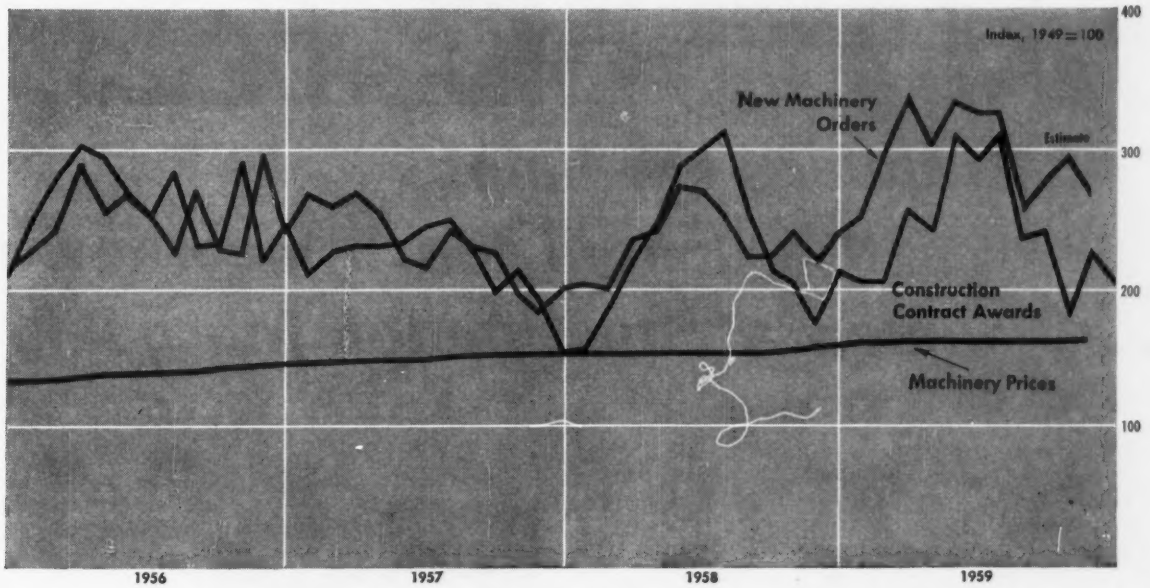
Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Trends in the Machinery Market



Price Index

	NOVEMBER 1959	MONTH AGO	YEAR AGO	% CHANGE 1958-1959
All Types of Equipment	173.0	172.5	168.0	+ 3.0
Cranes; Draglines, Shovels	**170.5**	**170.5**	**166.3**	**+ 2.5**
Shovel, ½ cu yd	165.0	165.0	156.2	+ 5.6
Shovel, ¾ cu yd	173.9	173.9	170.3	+ 2.1
Shovel, 1-1½ cu yd	184.3	184.3	180.7	+ 2.0
Shovel, 2-2½ cu yd	164.7	164.7	156.6	+ 5.1
Shovel, 3-3½ cu yd	167.8	167.8	162.7	+ 3.1
Shovel, 6 cu yd	195.0	195.0	184.1	+ 5.9
Crane, truck mounted	166.2	166.2	168.1	— 1.1
Crane, tractor mounted	135.1	135.1	135.1	0
Bucket, clam shell	157.5	157.5	152.7	+ 3.1
Bucket, dragline	169.3	169.3	185.0	— 8.5
Scrapers and Graders	**166.1**	**165.7**	**157.5**	**+ 5.5**
Scraper, 4 Wheel, 8-10.5 cu yd	155.0	155.0	155.0	0
Scraper, 4 Wheel, 12-15 cu yd	156.8	156.8	151.3	+ 3.6
Scraper, 2 Wheel, 15-19.5 cu yd (a)	126.9	123.7	122.7	+ 3.4
Grader, heavy duty	172.6	172.6	164.1	+ 5.2
Grader, light & medium	171.1	171.1	161.2	+ 6.1
Tractors (non-farm, incl industrial)	**188.8**	**187.8**	**180.5**	**+ 4.6**
Wheel type, off-highway (a)	129.0	128.2	129.2	— 0.2
Crawler type, 50-74 dhp	194.2	191.9	187.6	+ 3.5
75-99 dhp	197.2	196.4	190.8	+ 3.4
100-154 dhp	192.4	191.3	188.7	+ 2.0
155-200 dhp	201.3	201.3	196.4	+ 2.5
Machinery, Tractor Mounted	**169.0**	**168.6**	**165.6**	**+ 2.1**
Dozer, cable controlled	154.4	154.4	151.6	+ 1.8
Dozer, hydraulic controlled	186.6	186.6	180.7	+ 3.3
Cable power control unit	151.4	151.4	147.9	+ 2.4
Loader, tractor shovel	162.5	161.5	161.0	+ 0.9
Specialized Machinery	**156.9**	**156.4***	**150.7**	**+ 4.1**
Ditcher	152.8	152.8	154.1	+ 0.8
Roller, tandem	220.2	220.2	193.2	+14.0
Roller, 3 wheel	174.9	174.9	160.5	+ 9.0
Ripper and rooter	150.5	150.5	143.3	+ 5.0
Dewatering pump, 10 M gph	110.3	110.3	111.7	— 1.3
Dewatering pump, 90 M gph	151.0	150.5	144.3	+ 4.6
Portable Air Compressors	**167.5**	**167.5**	**159.5**	**+ 5.0**
Contractor's Air Tools	**181.6**	**181.6**	**164.5**	**+10.4**
Mixers, Pavers, Spreaders	**157.5**	**157.5***	**150.0**	**+ 5.0**
Mixer, portable, 11 cu ft	165.9	165.9	160.1	+ 3.6
Mixer, portable, 16 cu ft	172.2	172.2	163.7	+ 5.2
Mixer, truck, 6 cu yd	132.4	132.4	127.3	+ 4.0
Mixer, paving, 34 cu ft	193.5	193.5	183.9	+ 5.2
Concrete finisher & spreader	196.7	196.7	181.5	+ 8.4
Bituminous distributor	122.3	122.3	122.3*	0
Bituminous spreader	170.2	170.2	160.3	+ 6.2
Bituminous paver	167.4	167.4	153.0	+ 9.4
Off-Highway Trucks, Wagons (b)	**101.1**	**101.1**	**100.6**	**+ 0.5**
Contractors off-highway truck (b)	101.1	101.1	100.6	+ 0.5
Trailer dump wagon (b)	101.4	101.4	101.4	0

• (a) January 1955=100 • (b) January, 1958=100 *Revised

BLS Primary Market Price Indexes, U. S. Department of Labor, 1947-49=100

Tractor, Scraper Prices Move Higher

SLIGHT increases in the list prices of crawler tractors, two-wheel scrapers, and tractor-shovels raised the average price of major construction equipment to a record as of November 15. The Bureau of Labor Statistics price index edged up to a new all-time high of 173.0, based on average prices during 1947-49 as 100.

For the first 11 months of 1959, this index rose 1.6%. There may have been a few standard price hikes for other types of equipment by mid-December, but the index probably will not rise enough to bring the 1959 increase up to 1958's 3.1% rise. So last year's rise in equipment prices was the lowest since 1954 when prices changed very little.

But several types of equipment increased much more than the average. For example, BLS price sub-indexes show substantial increase during 1959 for rollers, bituminous spreaders and pavers, portable concrete mixers, truck mixers, concrete paving mixers, graders, pumps of 90 Mgph capacity, ½-yd, 2 to 2½-yd, and 6-yd shovels, and paving breakers.

By contrast, steady or slightly increasing prices of other types of equipment helped stem the tide. Included were off-highway trucks and wagons, crawler tractors of 60 or more hp, larger bulldozers, truck cranes, scrapers, and rubber-tired tractors.

The outlook for construction equipment prices this year is for more increases. But if steel prices hold, average equipment prices should not increase by more than 2%, as measured by the BLS index. Increased wage costs are likely to be the chief source of pressure for higher price tags.

Equipment makers' capacity probably won't be pressed hard by increased demand. So 1960 price increases are likely to be selective. Many of the 1960 price hikes are likely to come early.

Dragline gets inspection from Keith Hutchison, Greer vice president and technical director, Phil Owen and Chuck Daub (l. to r.). Owen and Daub are Standard Oil lubrication specialists who render the school technical assistance on lubrication problems. Both have engineering degrees and both have completed Standard's Sales Engineering School. Daub has ten, Owen five years of field experience serving commercial customers.

Standard Oil helps this school teach men how to keep a construction job going

Hutchison, Owen and instructor John Rolando watch student load 17-yard off-highway dirt hauler, one of school's 26 units.

Greer Excavating and Mechanics School has learned one of the lessons it teaches—how to keep equipment in service

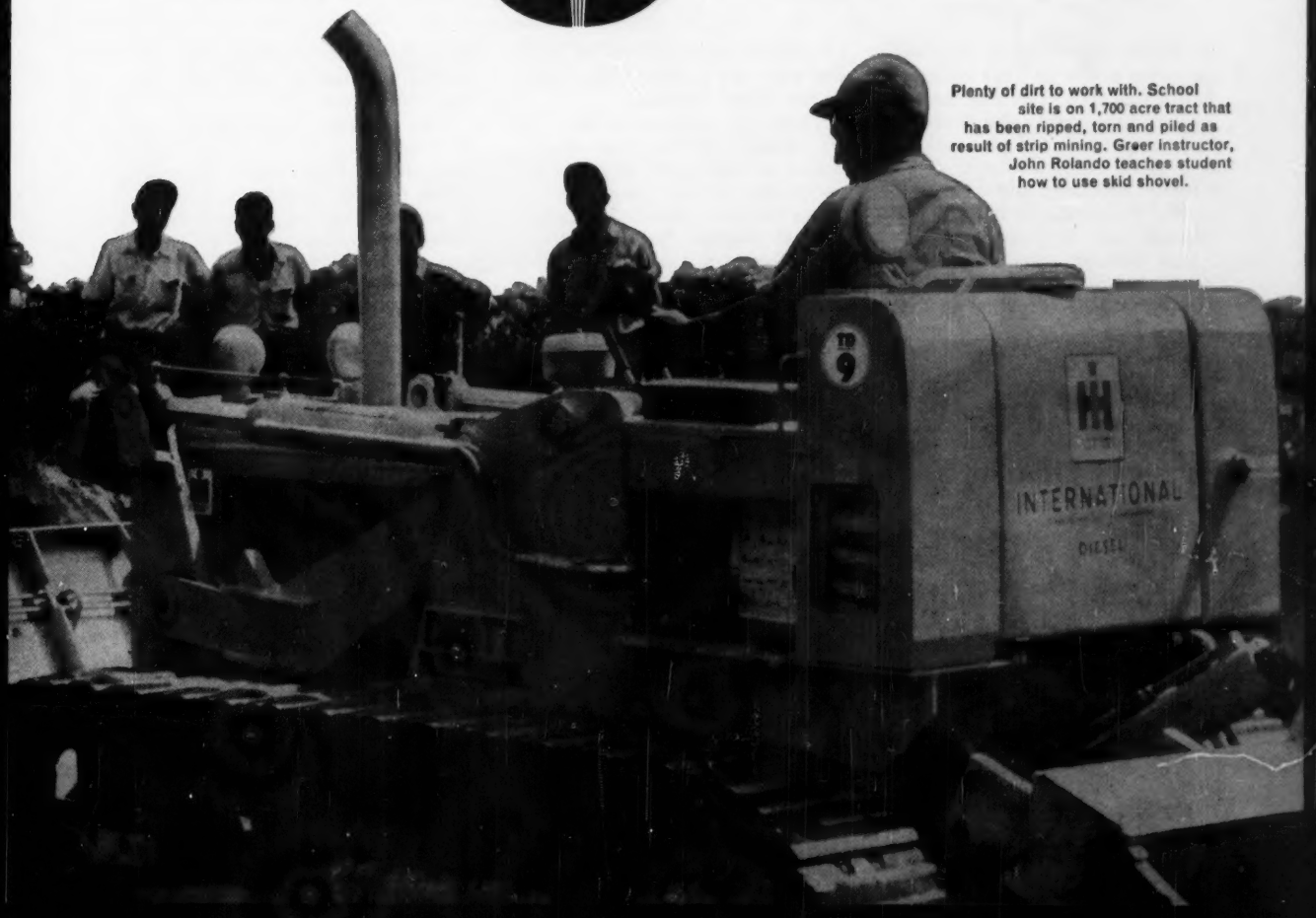
Situation: Time is money at Greer Excavating and Mechanics School, Braidwood, Illinois. The school promises its students hours of experience operating equipment. It teaches them how to maintain and service the machinery they work with. It also teaches the men how important it is to do the job right and on time.

Up to 70 students, guided by nine experienced instructors, work 26 pieces of equipment almost every daylight hour, seven days a week, winter and summer. Bulldozers, scrapers, trucks, shovels and draglines *must stay in service* in spite of the rugged treatment they get.

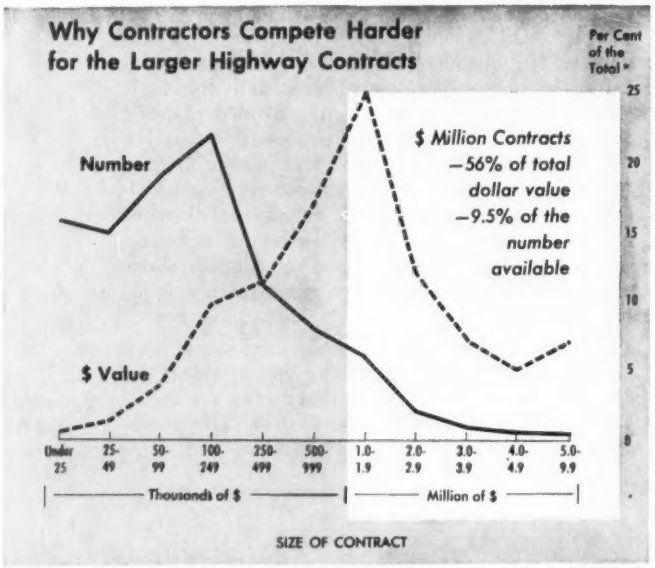
What was done: From the first day of school more than three years ago, Greer Institute's equipment has been serviced exclusively with Standard Oil gasoline, diesel fuel, motor oil and greases. No unit has ever been down due to lubrication failure or because of slow delivery. How come? Because Phil Owen, an experienced Standard Oil lubrication specialist from Joliet, just 20 miles from the school, makes regular calls to check out any lubrication problem. From Wilmington, only 5 miles away, Standard Oil agent R. J. Kavanagh makes deliveries of gasoline, diesel fuel, lube oil and grease as often as every other day. The school never needs to telephone for service.

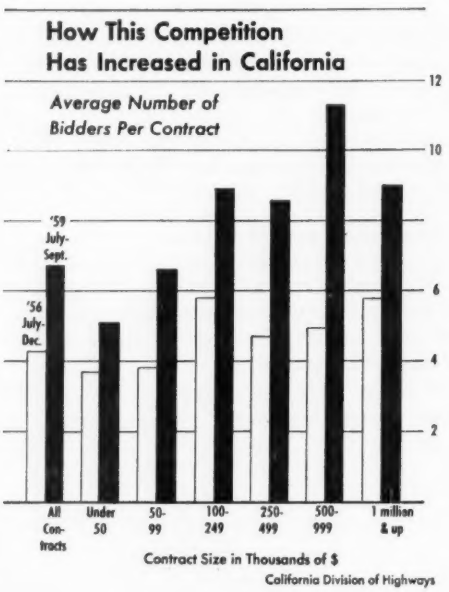
What you can do: To get this kind of service call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*



Plenty of dirt to work with. School site is on 1,700 acre tract that has been ripped, torn and piled as result of strip mining. Greer instructor, John Rolando teaches student how to use skid shovel.





Competition Hurts Roadbuilders

IT TOOK more work to make the same profit on 1959 highway and bridge jobs than any time in the last five years. The reason is that competition for road work is at a peak. More contractors are actively bidding, and their capacity to handle work has increased.

The tightest squeeze on contractor profit margins is on the larger jobs, those costing $1 million or more. These account for only a small percentage of total jobs available—9.5% of federal-aid primary and urban highway awards in the first half of 1959. But they are a very large chunk of the dollar volume.

These big projects usually offer contractors the best opportunity to make good on profit expectations through economies of high-volume operations lasting several months. So they attract more bidders than do smaller jobs.

Competition is sharper for smaller jobs, too. Contractors can handle much more new work than will become available in the foreseeable future. Temporary slumps in bid calls, such as in the summer of 1959, step up the competitive race.

You can see this in California, for example. For every two bidders in the second half of 1956, when first dirt moved on the interstate program, there were three or four bidders in the third quarter of 1959.

California road contracts costing $500,000 to $1 million drew an average of 12 bidders each at third quarter 1959 lettings. This was about double the average number of bids on all road con-

Highway Bidding Trends

Reported by state highway departments and the Bureau of Public Roads

	Bid Prices: 3rd Quarter, 1959				Competition: Bids per Project						
					—1958—				—1959—		
	3rd Q Index, 1949 = 100	2nd Q %	Year Ago %	2 Years Ago %	Q1	Q2	Q3	Q4	Q1	Q2	Q3
US Composite—BPR	**112.1**	**+0.2**	**— 1**	**— 4**	**—6.8—**		**—6.6—**		**—7.4—**		**n.a.**
California	136.5	— 4	+14	+10	9.3	5.4	5.5	6.3	8.2	6.3	6.7
Colorado	89.3	— 3	—11	—11	9.9	8.6	8.4	9.6	7.8	n.a.	n.a.
Florida	133.0	— 3	— 9	— 1	7.1	5.5	5.0	5.9	5.3	5.3	5.3
Idaho (1950 = 100)	77.5	—12	—20	—46	7.1	7.5	5.3	7.0	7.1	4.3	4.6
Michigan	109.9	—0.2	+ 7	— 6	n.a.	6.3	5.7	6.9	8.5	5.7	5.5
Nevada (1955 = 100)	105.7	+ 3	—15	—18	8.8	6.6	5.7	7.1	5.7	5.0	6.6
New York	113.2	+ 1	—11	—11	7.0	6.0	6.0	5.0	7.9	9.2	6.2
Oregon	91.3	0	—12	—12	10.4	6.2	5.9	8.4	6.9	6.0	6.3
South Dakota	99.3	+11	+23	+ 8	10.0	5.8	6.8	6.4	6.9	8.5	9.7
Texas	121.5	— 3	—10	— 1	6.3	4.7	5.7	5.9	6.4	n.a.	n.a.
Washington	91.8	+ 1	— 7	—13	9.1	6.0	4.9	8.0	9.8	6.5	6.0

Special report to owners of Traxcavators, D6 and D4 Tractors

CAT CATERPILLAR

Parts you can trust
Dependable round-the-clock service

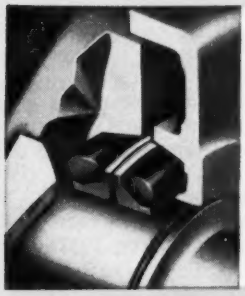
Now available...lifetime lubricated rollers...two-way savings...

ELIMINATE MAINTENANCE GIVE LONGER LIFE

Here's another cost-cutting improvement for Traxcavators and both D6 and D4 Tractors . . . lifetime lubricated rollers. Now you can eliminate on-the-job shutdowns for greasing. And you get longer life from rims, flanges, internal parts. The payoff . . . reduced replacement costs, savings in time.

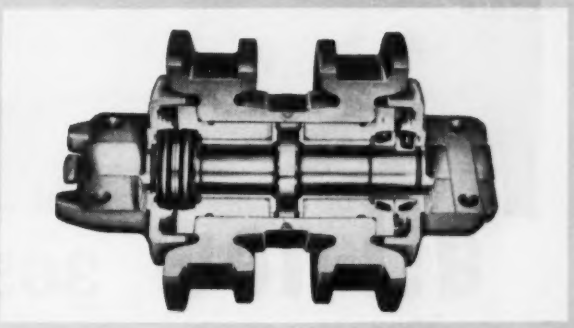
How maintenance is eliminated—the new Cat-built rollers are lubricated when first installed. They are equipped with floating ring seals that keep lubricant in . . . grit out . . . for the life of the rollers. Only when rollers are disassembled for rebuilding will relubrication be necessary. And the original metal rings can be reused.

New floating ring seal . . . only four parts, no springs. The roller seal employs two alloy metal rings and two rubber "O" rings. The metal rings, much harder than the best file steel, have lapped faces, smoother than glass. These faces taper slightly toward the inner edge forming a sealing area at the outer edge. As wear occurs, the sealing area moves gradually inward, maintaining a perfect seal for thousands of hours.



The "O" rings keep constant pressure on the metal rings. Lubricant can't get out. Grit can't get in. There are no springs or diaphragms to weaken, wear or become damaged. The "O" rings are made of special compound to resist oil, heat, cold.

Why do roller parts last longer? Grit is permanently sealed out. Big lubricant reservoirs (with strategically located oil passages) insure ample supply of lubricant to moving parts. Oil instead of grease is used for roller lubricant. Oil dissipates heat faster, circulates more freely than grease. These features assure you of longer shaft and bearing life. Longer bushings with extra-thick flange assures rigid support. Large sleeve bearings provide ample bearing area. Larger diameter, deep-hardened shafts withstand higher shock loads. Beam strength has been increased 63% for D6 shafts; 185% for D4 shafts. Resistance to side thrust is



greatly increased in D4 shafts by a 25% wider center flange and 73% more thrust-bearing area.

Why do rims and flanges last longer? The new two-piece roller shell has greater strength and impact resistance. Special heat-treat process provides extra-hard and deep wear surfaces. Ample steel under tread gives strong support to resist shock loads. Thicker flanges combat peening over. Overlapping center joint maintains rigid shell without separate hub.

Easy installation is achieved by use of snap rings to hold the seals and end collars in place before mounting. End collar bolt holes will line up easily with track roller frame holes during installation.

Millions of hours of proof—the toughest track rollers yet. Cat lifetime lubricated rollers have been subjected to extensive and exhaustive on-the-job tests for over 5 years. Working on all types of job conditions, these time-tested rollers have proved to be unequaled. And machine-owner reports prove that Cat lifetime lubricated rollers can't be beaten for low-cost, minimum maintenance operation.

See your Caterpillar Dealer. He'll give you the full story on this time-saving, money-saving undercarriage component.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

SERVICE TIP: When rebuild time finally comes, be sure to keep the metal rings matched in original pairs, being careful not to nick or mar the lapped surfaces.

CATERPILLAR

Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

all-new 365-cfm GYRO-FLO

...a heavy-duty portable compressor with MORE POWER and MORE PERFORMANCE

Ingersoll-Rand, the pioneer builder of portable rotary compressors, now offers a completely new size Gyro-Flo portable—the DR-365. This rugged, all-new compressor provides 365 cfm of mobile air power—16% more than its predecessor, the Gyro-Flo 315. Yet, the DR-365 is no bigger than the 315 cfm Gyro-Flo, and its larger, more powerful engine retains the same 1800 RPM speed.

Take a closer look at what this all-new compressor offers: A new, simplified, more-efficient compressor system with...automatic drainage of oil from cylinders when the unit is shut down...dependable Air-Glide capacity control for 100% stepless regulation...a 12-volt battery system for faster, easier starting... side covers that fold back safely out of the way... a full-length, large capacity tool box to provide extra storage space...all operating controls, fuel tank, filters and tool storage enclosed by lockable side covers. These are just a few of the many features that mean more power, better performance, and greater convenience and safety, too.

The Gyro-Flo 365 is powered by the GM 4-71, 4-cylinder diesel engine. The Gyro-Flo 365 has a heavy-duty, spring-mounted running gear with automotive-type steering—every part built to withstand the hard service encountered on construction jobs. And remember, Ingersoll-Rand's Gyro-Flo line is complete ...six sizes that have become first choice among performance- and economy-minded construction men.

Ask your Ingersoll-Rand representative for complete information or send today for Bulletin 2932.

DIMENSIONS AND WEIGHTS	DR-365 with Diesel Engine
4-WHEEL MOUNTING	
Weight (dry)	5939
Weight (wet)	6640
Length (less drawbar)	10′ x 5¾″
Width	5′ x 8″
Height	6′ x 10½″
Track	56
LESS RUNNING GEAR	
Weight (dry)	5279
Weight (wet)	5980
Length	10′ x 2⅞″
Width	4′ x 9½″
Height	5′ x 2¾″

Ingersoll-Rand
2-959 11 Broadway, New York 4, N.Y.

AN UNBEATABLE COMBINATION...GYRO-FLO COMPRESSORS AND I-R ROCK DRILLS

tracts, most of which were under $100,000 each. Two combined road-bridge contracts valued at over $1 million each also averaged 12 bids.

Number of bids per job also increased with the size of bridge contracts, except for three multi-million-dollar bridge contracts that drew an average of seven bids compared to 10 for bridges costing $100,000 to $1 million. By contrast bridges costing under $100,000 drew only about five bids per job. (The smaller number of bidders on the largest bridges probably reflects the fewer companies pre-qualified to bid on this size bridge.)

Bid Price Competition

The highway and bridge construction market lost some of its allure for contractors during the second half of last year. The steep drop in available work—down 17% from the first half, according to contracts reported by *Construction Methods*—brought sharper price competition in several states.

Bid prices in the third quarter declined in five of 11 states whose highway departments reported their price indexes to *Construction Methods*. Two states show about the same prices as bid on second quarter lettings, and price indexes for four states increased in the third quarter. For the U. S. as a whole, bid prices (federal-aid jobs) held about steady in the third quarter, according to the Bureau of Public Roads Composite Mile Index.

Considering the fact that third quarter costs of labor were up over the preceding quarter and the uncertainty about future steel deliveries due to the steel strike, it is surprising that prices didn't turn upward in more states. For even though there was a sharp drop in available new work during the summer months, bid prices had already been trimmed to a point where many states were paying the lowest prices in two or three years for new highway and bridge construction.

Moreover, cutbacks in interstate contracting schedules, forced by a threatened exhaustion of federal aid funds, meant fewer large projects coming up for bids. This left contractors with smaller projects to bid on and could have led to higher unit prices. Yet out of 11 states, only South Dakota reports a significant increase in third quarter bid prices.

Higher Prices Likely

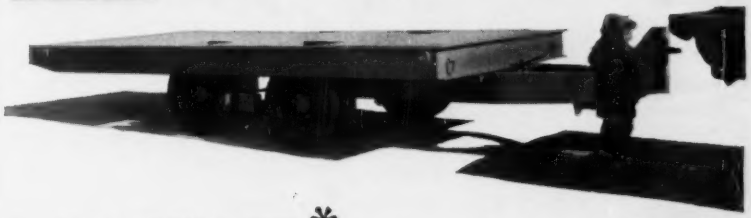
This year, however, will probably bring a firming up in contractor bid prices. Not only are basic costs of labor headed for another rise, but cement is going to cost more in many parts of the country.

Moreover, a tremendous upsurge in new work coming up for bids in the first six months is likely to take some of the edge off the sharp competition. This could give contractors the opportunity they've been looking for to include more reasonable profit margins in their bids.

contracts awarded on page 54

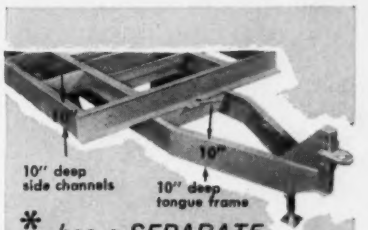
DON'T BE FOOLED

all tilt trailers are NOT alike...



only a MILLER:*—*is so perfectly balanced*

a child can hitch it!



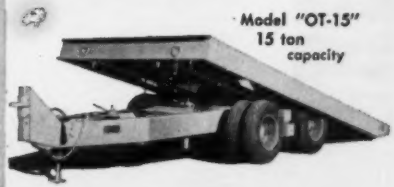
**—has a SEPARATE tongue frame*

The tongue in the OT-15 is not merely suspended from the platform frame (as in many tilt trailers), it's a frame in itself. With a platform pivot point way back near the rear wheels, MILLER provides the lowest possible platform without a "beaver tail" hump.

ORDINARY tilt trailers creep or force wheels back on loading

need hazardous beaver tail with unsafe over-the-hump loading

Like beauty, performance is more than skin deep. A lot of tilt trailers may look alike "at a distance" . . . but when you *really compare* . . . on a feature-by-feature basis, you'll find so much more performance-per-dollar in a MILLER Tilt-Top. Look for example, at the amazing unretouched, hitching photo above. The massive OT-15 weighing about 6000 lbs. is so perfectly counterbalanced that it takes only 35 lbs. of lift to hitch the tongue. And look at *all the other advantages*, illustrated at the left, that you get with a MILLER. When buying a trailer *don't be fooled* by price comparisons alone. Compare where it counts . . . and you'll find each of 10 MILLER models from 4 to 22 ton capacity the best buy, by far!



Miller Tilt-Top Trailer Inc.

457-D S. 92nd St. Milwaukee 14, Wis.

OWEN BUCKETS

THE GIANT OF THEM ALL

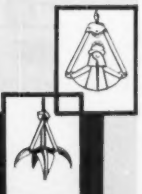
The following five combined features make OWEN the big giant performer . . . for any type of clamshell work . . . for any model or make of crane.

1. Block and Tackle Type Reeving
2. One-Piece Head Construction
3. Riveted Bowl Assembly
4. Single Main Shaft
5. Recessed Lips

Added to these construction features are more than fifty years experience in the manufacturing of clamshells . . . and nothing else! For any job that requires a clamshell, there is an Owen to fill the bill . . . backed by proven construction design and over one-half century of experience.

Put the Giant on your crane — OWEN — and know the work will be done faster, better and more economically.

Write today for any specific or additional information



The OWEN BUCKET Co.
BREAKWATER AVENUE, CLEVELAND 2, OHIO
BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

SOME BIG CONTRACT AWARDS OF THE MONTH

Montag, Halvorson, McLaughlin Associates, Portland, Ore., comprising **C. J. Montag & Sons,** and **Carl M. Halvorson, Inc.,** of Portland, Ore. and **McLaughlin, Inc.,** Seattle, Wash. A joint venture to construct the John Day Dam in Klickitat County, Wash. Corps of Engineers, City-County Airport, Walla Walla, Wash. $32,381,096.

MacDonald, Scott & Associates, St. Louis, Mo. A joint venture of **MacDonald Construction Co.,** St. Louis, Mo., **Scott Construction Co.,** Oakland, Calif., **C. H. Leavell & Co.,** El Paso, Tex., **Morrison-Knudsen Co., Inc.,** Los Angeles, Calif., **Paul Hardman, Inc.,** Stanton, Calif., and **F. E. Young Construction Co.,** San Diego, Calif. Construct three Titan missile launching sites with control center and related technical facilities at Larson Air Force Base, Moses Lake, Wash. Corps of Engineers, City-County Airport, Walla Walla, Wash. $31,600,722.

Dravo Corp., Pittsburgh, Pa. Construct locks for the Pike Island Locks and Dam on the Ohio River near Steubenville, O. Corps of Engineers, 925 New Federal Bldg., Pittsburgh, Pa. $22,868,706.

Martin K. Eby Construction Co., Wichita, Kan. Construct launching facilities for Atlas missiles at nine sites within 60 mi radius of Cheyenne, Wyo. Corps of Engineers, 1709 Jackson St., Omaha 2, Neb. $22,143,981.

George A. Fuller Co., Dallas, Tex. Erect a steel frame manufacturing plant with associated laboratory-office at Albuquerque, N.M. American Gypsum Co., c/o F. M. Standley, Simms Bldg., Albuquerque, N.M. $8,110,000.

H. L. Vokes Co., Cleveland, O. Erect two 12-story office buildings in Detroit, Mich. Northland Center Corp., 2 Northland Center, Detroit, Mich. $8,000,000.

Philip Farnsworth & Co., New Orleans, La., Grading and erection of overpass structures for 1.44 mi of Route 1-10 in Orleans Parish, La. State Dept. of Highways, Room 426, Administration Bldg., Baton Rouge, La. $3,221,-174.

Industrial hose and other rubber products since 1870

Acme Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

28 "EUCS"

BUILDING 11 MILLION YD. EARTH-FILL DAM

30 YD. BOTTOM-DUMPS ON LONG, HIGH SPEED GRAVEL HAUL... REAR DUMPS HANDLE BIG ROCK LOADS

Hills Creek Dam in western Oregon is part of the Willamette Valley Project under construction by the Corps of Engineers to provide flood control, navigation, power and irrigation. The embankment will require 11 million yards of earth and gravel fill and is scheduled for completion in 1961... it will be 2,400 feet in length and will have a maximum width of 1,600 feet at the base and 24 feet at the crest.

Green-Tecon, a joint venture of Green Construction Co., Des Moines, Iowa, and the Tecon Corporation of Dallas, Texas, have the earthmoving contract. These contractors are using a fleet of 28 Euclids on this big job . . . 13 Bottom-Dumps of 30 yd. and 7 of 17 yd. struck capacities and 8 Rear-Dumps of 22 and 27-ton capacities. The big "Eucs" work two ten-hour shifts six days a week... have marked up an excellent record of productive capacity and job availability.

Whether your operations involve big earthmoving projects like this one or small grading, stripping and industrial work, there's a Euclid model to match your requirements. Get all the facts and figures on the modern Euclid line of crawler tractors, scrapers, rear-dump and bottom-dump haulers from your Euclid dealer.

Six 27-ton and two 22-ton Rear-Dump "Eucs" haul rock from the quarry to the fill... all of these units are equipped with Torqmatic Drives and Torqmatic Brakes.

EUCLID Division of General Motors
Cleveland 17, Ohio

EUCLID (GREAT BRITAIN) LTD.
Lanarkshire, Scotland

A 7½ yd. dragline loads a Model LDT Bottom-Dump Euclid with 40 yds. of river gravel for 2½ mile haul to the fill. Green-Tecon have 13 of these big "Eucs" that are powered by 12 cylinder GM diesel engines of 432 h.p. with Torqmatic Drive.

Big loads of heavy gravel move over good haul roads at fast travel speed in these Bottom-Dump "Eucs". Torqmatic Drive — torque converter and semi-automatic transmission — provides full-power shift and a smooth flow of power to meet all road and grade conditions on the 5 mile cycle.

Well-maintained haul roads enable the Rear-Dumps to utilize their fast travel speeds on the 4500 ft. rock haul. On downgrades that are a maximum of 15% Torqmatic Brakes provide positive control of speed.

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Harold C. Scholtz
Manager
TOM JOHNSTON GRAVEL CO.
Ferrysburg, Michigan

"The Twin Disc Torque Converter Drive is ideal for our barge-loading operation. It makes for faster production and lower maintenance costs. The crane operator likes the converter too; it lets him 'feel' the load for control and safety."

This Manitowoc Model 3000 Crane is used to load 600-ton barges on Lake Michigan. Equipped with a Continental SD-802 Engine and a Twin Disc Three-Stage Torque Converter, it averages 3000 cubic yards of gravel per day.

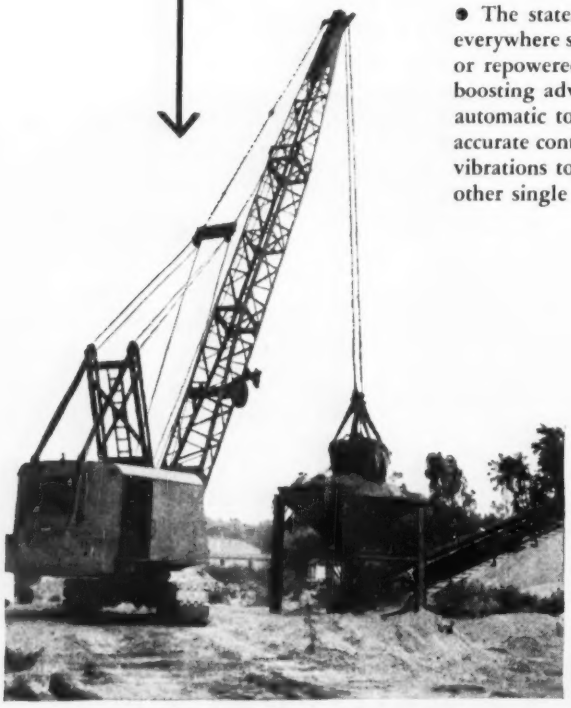
Ernie Bruns
Owner
BRUNS CONSTRUCTION CO.
Zanesville, Ohio

"I'd say a torque converter makes the shovel operator's job twice as easy. Picking up heavy loads is smooth and effortless, and there are no stalls or shocks even in the roughest rock."

On this road building project near Ironton, Ohio, Bruns' Marion 111-M Shovel with Cummins Engine loaded more than a million yards of blasted rock in twelve months. A Twin Disc Torque Converter helped make this outstanding performance possible.

SOLD on torque

• The statements quoted here are typical of what construction men everywhere say about Twin Disc Torque Converter Drive. On your new or repowered machines, a torque converter provides plenty of profit-boosting advantages: elimination of engine lugging and stalling . . . automatic torque multiplication to match load demands . . . smooth, accurate control under all load conditions . . . absorption of shocks and vibrations to safeguard engines, cables and turntable mechanisms. No other single feature adds so much in productivity or long-life service.



TWIN DISC CLUTCH COMPANY, RACINE, WIS.

John C. Hickey
General Superintendent
BAKER & HICKEY
Columbus, Ohio

"A torque converter gives the crane operator perfect control. He has at his command the exact speed ratio needed to 'inch' or hold the machine under full power. Heaviest loads can be spotted exactly without worrying about jerk and sway."

Baker & Hickey's 25-ton Lima Model 44 Crane features a 65' open-throat boom. It gets smooth, efficient performance from its 150 hp Cummins JBIS Engine with a Twin Disc Single-Stage Torque Converter.

James W. Smith
Superintendent
LAYNE INC. OF FLORIDA
Hallandale, Florida

"A torque converter is a must in coral rock digging. A straight mechanical drive couldn't take the punishment. The converter not only takes the shock off cables and power train, but gives us the torque increase we need to go through hardest rock."

This Lorain 85-A Dragline powered by a Cat D337 Series F Engine, is excavating a canal for Layne's $4 million waterfront housing project. A Twin Disc Three-Stage Torque Converter provides extra torque to come through hard cap rock.

converter drive!

All these shovel and crane manufacturers offer Twin Disc Torque Converter Drive as standard or optional equipment . . .

American Hoist	Manitowoc
Bucyrus-Erie	Marion
Koehring	P & H
Lima	(Harnischfeger)
Link-Bolt	Thew-Lorain

TWIN DISC

TWIN DISC
Torque Converters

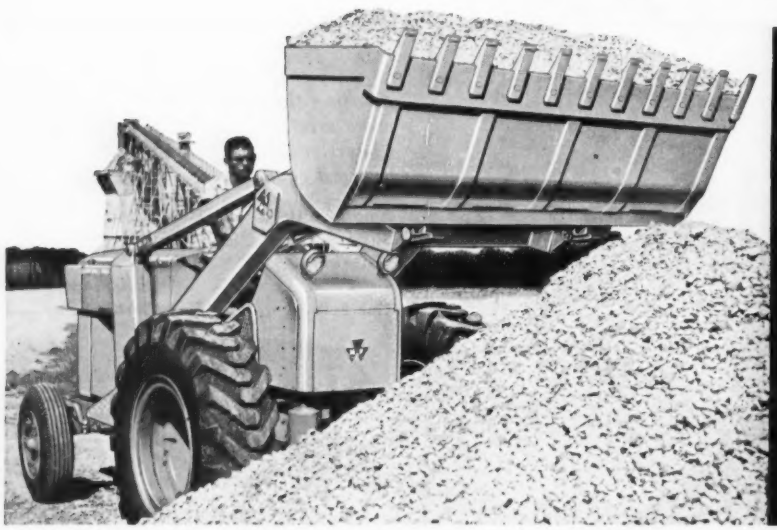
HYDRAULIC DIVISION, ROCKFORD, ILLINOIS

to finish ahead of
more expensive equipment

the MASSEY-FERGUSON 1001
TRACTOR SHOVEL

Speaks for Itself:

"HAVE DONE... CAN DO!"



Featuring Exclusive

INSTANT REVERSE

Go Forward or Back at a Touch of your Toe!

NO SHIFTING...

NO CLUTCHING...

NO LEVERS TO PULL!

Fast in-and-out maneuverability, with exclusive "Instant Reverse," give the Massey-Ferguson 1001 power, speed, and agility to outperform larger, more expensive single-purpose machines! Direct thrust from low pivot points . . . 9300 lbs. pryout power . . . 43° rollback at ground level . . . and telescoping loader arms, make the rugged 1001 the *outstanding tractor shovel* buy in the 1-cu.-yd. class. A complete line of power-matched attachments for sweeping, dozing, lifting, ditching, or scarifying give low-cost versatility. It does it for others; it can do it for you. Let your M-F Industrial Dealer arrange an on-the-job demonstration today!

Why Wait? — Set a Date — We'll Demonstrate!

MASSEY-FERGUSON INDUSTRIAL DIVISION
Block 1000 South West St., Wichita 13, Kansas

Producing Sizeable Power for the "Sensational 60's"

MF 60-3

PICTURE OF THE MONTH

High Bridge Grows Out from Its Piers

• Mobile cantilevered scaffolds carry the forms for the hollow, prestressed concrete girder of the Savines Bridge in southern France. The 3,031-ft bridge may be the longest yet built by the balanced cantilever method. It has 11 spans 253 ft long plus a half span at each end.

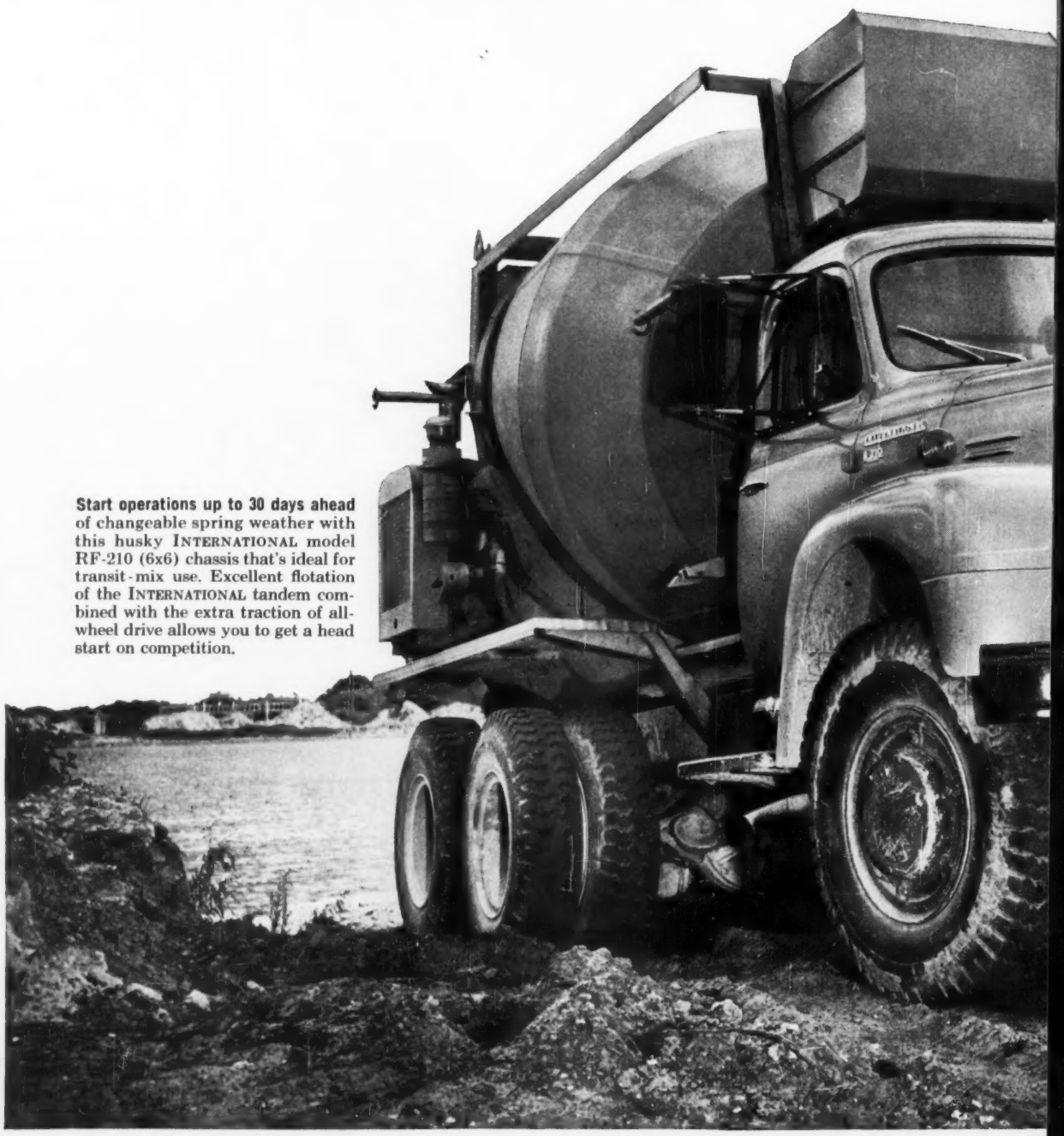
The piers also are hollow and prestressed. The two tallest stand 141 ft high. The French contractor builds the piers with sliding forms, then concretes the section of the girder directly over the pier and an 8.4-ft extension on each side with forms tied to the pier.

After this section is prestressed, they set up the mobile scaffolds and build out the girders symmetrically in 11.6-ft sections. It takes about a week to concrete, cure, and prestress each pair of sections. Then the mobile scaffolds move out on to the new sections to form the next pair.

Each of the steel frame scaffolds has a tail section about 25 ft long that carries a 33-ton counterweight to balance the load of concrete in the forms. The tail section is mounted on wheels that run on rails over the girder. Contractor is Societe des Grands Travaux de Marseille.

TRACTION when and where you want it

WITH INTERNATIONAL TANDEM-AXLE ALL-WHEEL-DRIVE CHASSIS



Start operations up to 30 days ahead of changeable spring weather with this husky INTERNATIONAL model RF-210 (6x6) chassis that's ideal for transit-mix use. Excellent flotation of the INTERNATIONAL tandem combined with the extra traction of all-wheel drive allows you to get a head start on competition.

Now you can get to the job with heaviest payloads—and equally important, get out to come back for more—with INTERNATIONAL six-wheel *all-wheel-drive* chassis.

Schedules are met smoothly because INTERNATIONAL supplies the ideal combination of big, tough axle and frame for maximum payloads . . . and all-wheel drive to ease out of time-consuming bog-downs.

You can sell customers better service with INTERNATIONAL *all-wheel-drive* chassis. They add new flexibility to your fleet, new versatility to your business operations.

All-wheel-drive chassis are available with up to 501 cu. in. gasoline engine or optional LPG engine. Power steering, or any special feature you may need, is available, too. See your INTERNATIONAL Truck Dealer today.

INTERNATIONAL® TRUCKS WORLD'S MOST COMPLETE LINE ®

INTERNATIONAL HARVESTER COMPANY • Motor Trucks • Crawler Tractors • Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

Better products, *faster,* from your Federal-Mogul jobber:

Federal-Mogul Sintered Engine Bearings keep the "pay" in payloads longer!

Big loads . . . power-packed engines put high loads on bearings . . . need Fm copper-lead bearings to keep power at a peak

Giant off-the-road vehicles and equipment call for plenty of constant power to keep loads moving and contractors earning. That's why, more than ever, engines need Federal-Mogul sintered bearings. Research-developed for heavy-duty service, each bearing has five distinct layers: 1. Steel back for strength and bonding quality; 2. Pure copper-lead powder sintered to make the bearing surface; 3. Brass barrier for lining stability; 4. Lead-tin overplate for smooth "break-in"; 5. Pure tin flash plate for corrosion protection.

One sure way to stretch engine overhaul periods is to specify Fm bearings, as most engine rebuilders do. Your Federal-Mogul jobber is well stocked with types and sizes to give you *fast service* to help you keep the "pay" in *pay*loads longer.

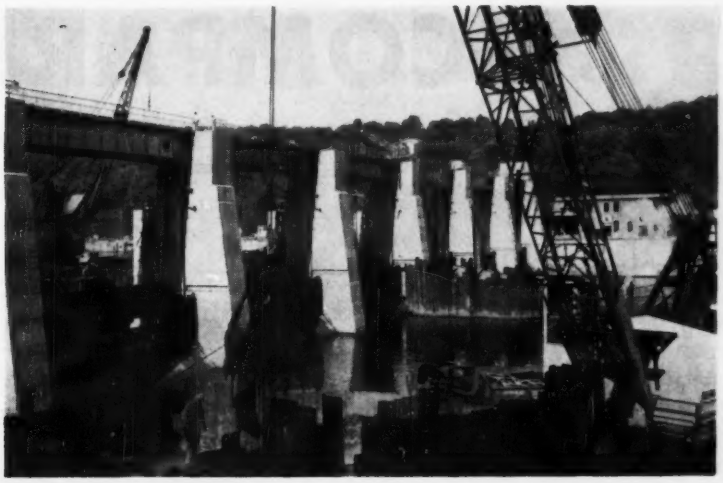
FEDERAL-MOGUL ENGINE BEARINGS

BEARING FEDERAL Mogul SERVICE

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

Construction News in Pictures . . .

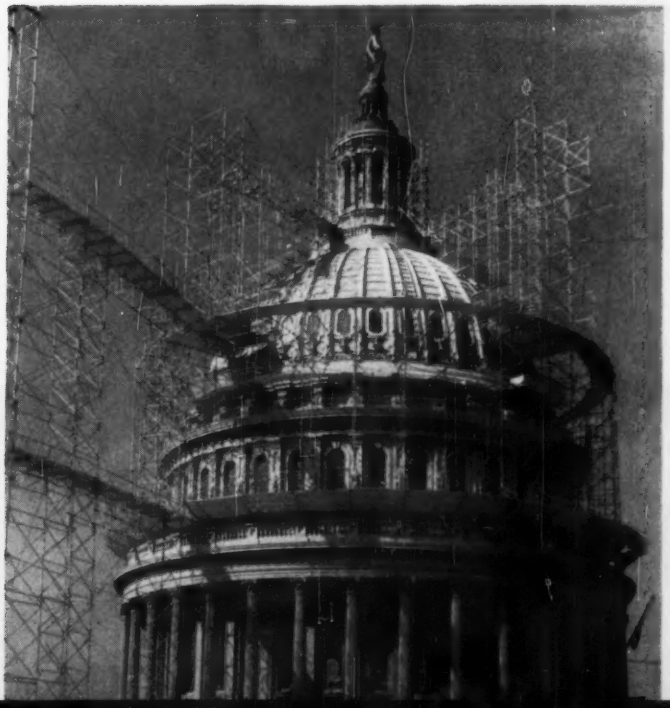


Winding It Up

Derrickboat pulls piling in second stage cofferdam at Lock and Dam 8 on the Monongahela River near Point Marion, Pa. Dravo Corp. of Pittsburgh carried out a $2.5-million renovation that converted the 32-year-old fixed crest concrete dam into a movable crest dam topped by seven reinforced concrete piers and six tainter gates.

Around and Around

Three Manitowoc cranes circle a caisson for a sewage pumping station in Boston eight times to pour each 12-ft lift of concrete. To keep each lift monolithic, Perini Corp., used Daratard, a retarding agent, poured layers 18 in. thick, and vibrated each layer with the one beneath it. Circumference of the caisson is 399 ft; walls are 9 ft thick.



Capitol Repairs

Four equidistant towers of Universal scaffolds, erected around the dome of the Capitol in Washington, D.C., and connected to it by trusses, keep weight off the 100-year-old dome while it is repaired. Scaffolding hung from the trusses enables workers to reach any part of the dome. J. F. Fitzgerald Co. of Canton, Mass., is the contractor.

When You're Pondering
COMPARE

There's more to a Moretrench Wellpoint than meets the casual eye. As this cutaway view of our standard 2" self-jetting model indicates, a Moretrench Wellpoint is a skillfully-engineered tool.

The economy model — Moretrench 1½" Self-Jetting Wellpoint

For high capacity — Moreflow Wellpoint, Drawdown-Type

For very high capacity and pressure relief — Moreflow Wellpoint — Open-Type

Low-Cost expendable model Moretrench Type X Wellpoint

Special Types of Moretrench Wellpoints

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New Jersey
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WESTERN REPRESENTATIVE: Andrews Machinery of Washington, Inc., Seattle 4, Washington
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BRAZILIAN REPRESENTATIVE: Oscar Taves & Co., Ltd., Rio de Janeiro

Pumping Equipment

POINTS as well as PRICES...

Ask our sales engineer to show you the construction of a MORETRENCH WELLPOINT.

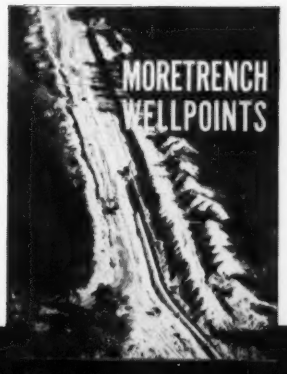
You'll see at a glance why experienced contractors pay *more* for Moretrench. They GET more . . . every time. Here's why:

MORETRENCH WELLPOINTS ARE:

1. Better made.
2. Built with a larger, unblocked water-passing screen area.
3. Easily and properly installed.
4. Practically clog-proof.
5. Specifically designed in five different types for the most efficient dewatering of various types of soil.

Fewer points dry the job. Installation, operation and removal costs are proportionately lower. Results are immediate. You are free to dig as fast as you like — by any method you like — IN THE DRY.

In pumping it's the *FINAL COST* that counts. Moretrench Wellpoints cost a little more, *save much money.* Get the best — first.



To know more about Moretrench Wellpoints and their special applications, send for our new illustrated bulletin — MORETRENCH WELLPOINTS.

MORETRENCH CORPORATION
Dept. M, ROCKAWAY, NEW JERSEY

Please mail me a copy of your new bulletin, Moretrench Wellpoints.

*Name*_____

*Company*_____

*Address*_____

Erecting Paired Girders

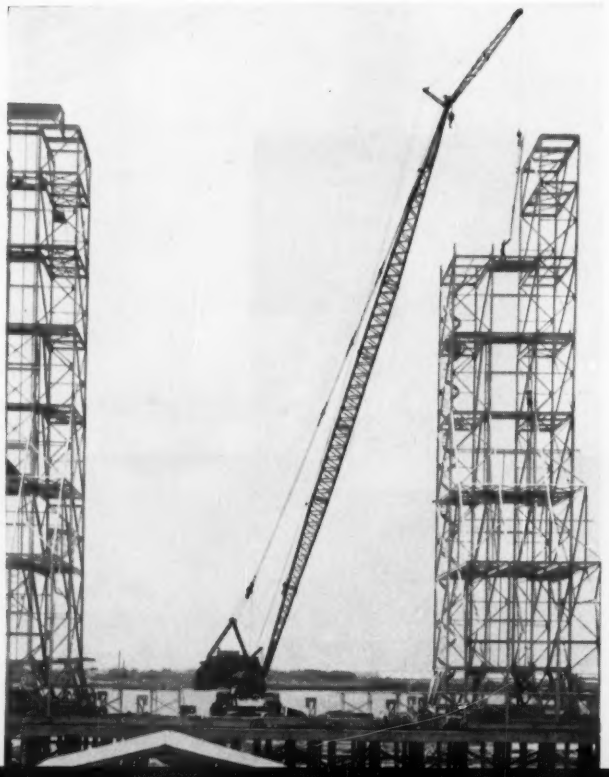
General Construction Co.'s 60-ton floating crane places bridge girders two at a time for the Washington State Toll Bridge Authority's Hood Canal Bridge. The parallel sections 135 ft long were bolted together with stiffeners by the steel fabricator and barged to the site. They form part of the 644-ft east approach to the brige.

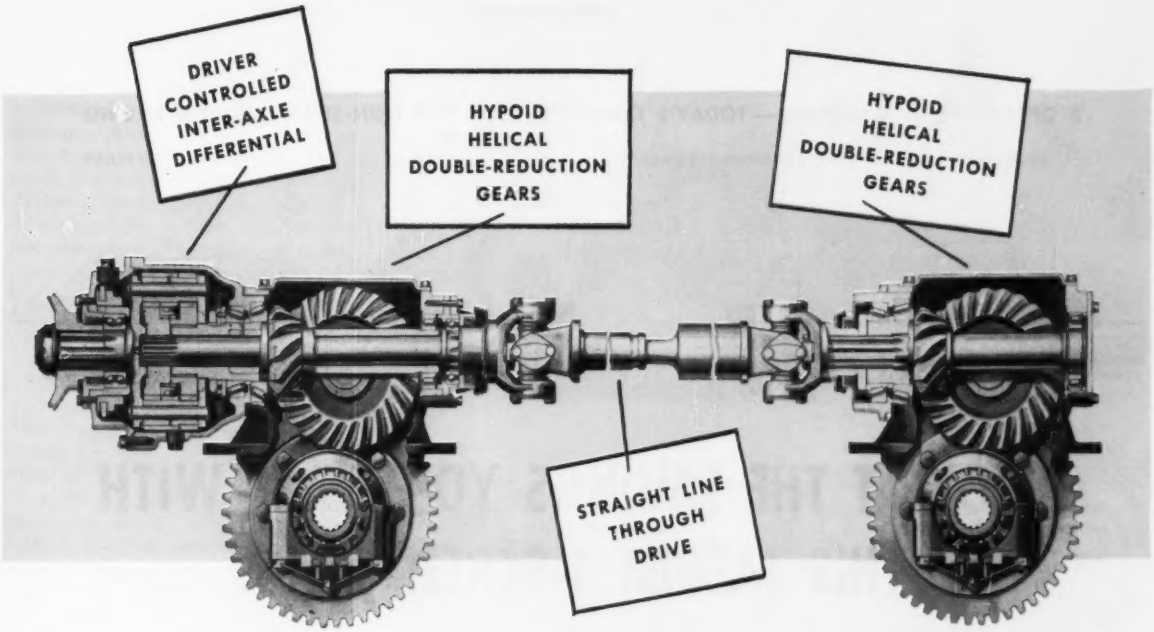
A Milestone

American Revolver moves last bucket of concrete of a 150-yd pour to bring the Niagara Generating Plant's intake deck up to final elevation over Unit No. 1. The structure stands 107 ft above bedrock at the forebay and 336 ft above river level. About 465,000 yd of concrete has been placed so far for the Niagara Project's main plant.

Crawler on a Cradle

Manitowoc crawler crane erects steel for ship unloading facilities in New Orleans. The track-mounted unloaders will roll along the dock, unloading grain from ships with bucket elevators. The crane carries a 160-ft boom and a 30-ft jib. It sits on a cradle of three 30-ft steel beams welded to rails on which the unloaders will ride.




DRIVER CONTROLLED INTER-AXLE DIFFERENTIAL
HYPOID HELICAL DOUBLE-REDUCTION GEARS
HYPOID HELICAL DOUBLE-REDUCTION GEARS
STRAIGHT LINE THROUGH DRIVE

Hypoid Double-Reduction Gears Make

TIMKEN-DETROIT® HEAVY-DUTY TANDEMS

first in performance, long life and low maintenance cost!

Timken-Detroit Heavy-Duty Tandems with Hypoid Helical Double-Reduction Gears give you payload leadership, long trouble-free service, economical performance. Here's why –

Double-Reduction. Two full sized gear sets form a balanced power train with each gear set accomplishing a healthy reduction. Husky hypoid first reduction gears and wide faced helical second reduction gears combine to form a rugged double-reduction drive that will outperform all others.

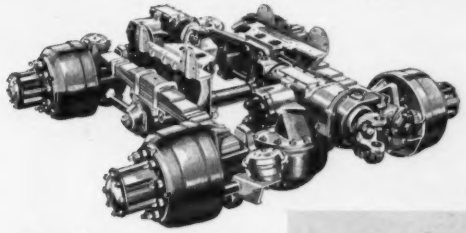
Widest Choice of Axle Ratios. Timken-Detroit "balanced design" full double-reduction does not limit the secondary gear set to a fixed low numerical value which depends on primary gear set for all ratio changes. The hypoid-helical gear arrangement permits a wider range of ratios because the numerical value of both the primary and secondary ratio gear sets can be varied.

Top-Mounted Straight Line Drive. Eliminates all prop shaft angularity. Bearing and gear life is increased. Maintenance costs reduced. Top-mounted position of carriers provides main drive shaft alignment – ideally suited for short wheel base trucks or tractors.

Driver Controlled Inter-Axle Differential. Divides torque equally between axles, yet compensates for any differential of speed between the axles. Both axles are always doing equal amounts of work . . . can be locked out at any speed when poor traction conditions exist.

Tough, Torsion Flow Axle Shafts Are Best By Any Test. Don't be misled . . . patented Torsion Flow Axle Shafts are still the best available to the American Trucking Industry. Comparison tests prove that Timken-Detroit Axle Shafts, spline diameter for spline diameter, are the toughest ever made.

©1959, R-S Corp.



World's largest manufacturer of axles for trucks, buses and trailers

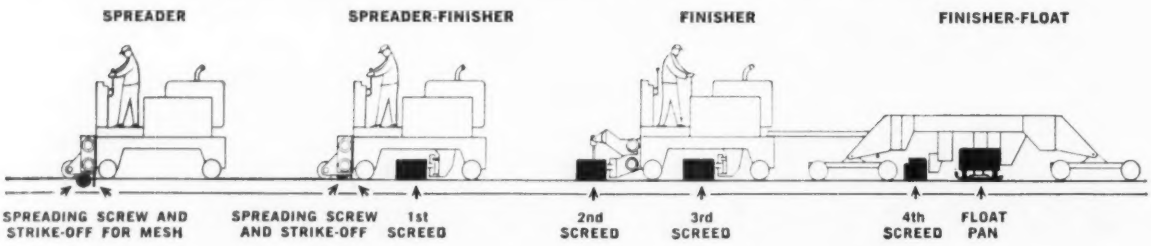
Another Product of...

ROCKWELL-STANDARD CORPORATION

Transmission and Axle Division, Detroit 32, Michigan

(Advertisement)

3 OPERATORS, 4 MACHINES — TODAY'S COMPLETE TEAM FOR NON-STOP 2-COURSE PAVING



LOOK AT THE SAVINGS YOU MAKE WITH THIS JAEGER 4-SCREED TEAM

Fully-integrated paving train for 20' to 26' slab gets faster production and smoother final finish, with smaller crews.

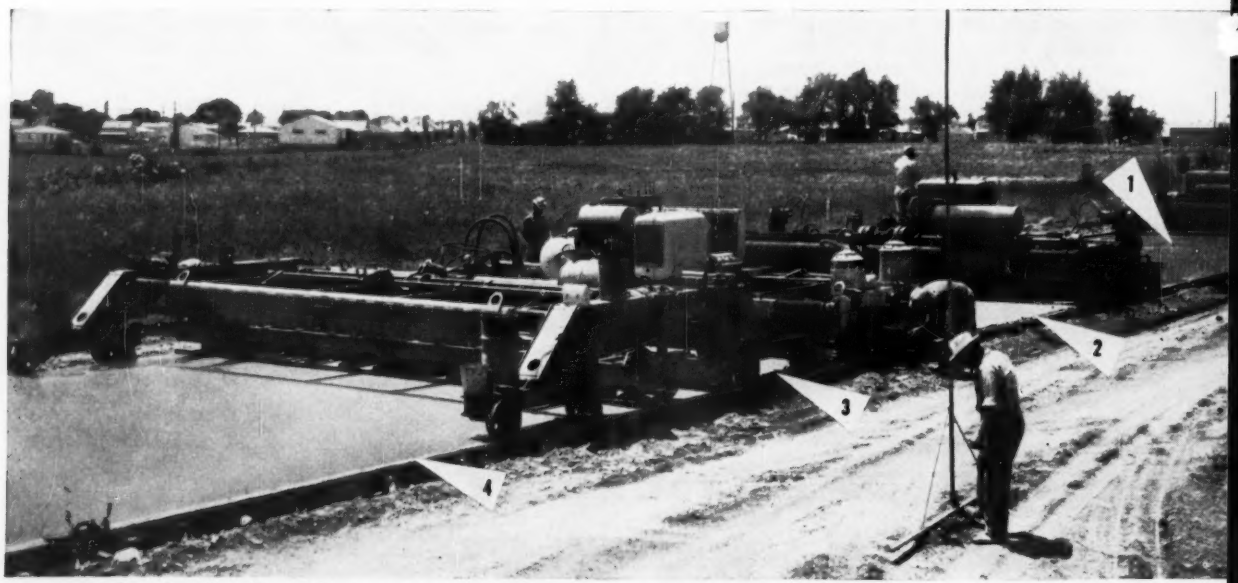
This is how low-bid contractors are saving important dollars in their paving operation: By using the lead Spreader on base course, followed by the Jaeger Spreader-Finisher, tandem-screed Finisher and Finisher-Float on top course, three operators now lay and finish reinforced slab in a steady, forward progression as fast as pavers can pour. Furthermore the finished surface is machine-perfect under the straight-edgers, ready for burlap drag and cure.

On full depth slab, where no mesh is needed, the base Spreader and its operator are eliminated. *Only 2 men are then needed* to spread, strike-off, give a 4-screed finish and final floating with suspended pan. This is possible because the same operator controls the Finisher and the Finisher-Float. (See diagram above).

Saves Overtime, Cuts Costs

Having the first finishing screed on the Spreader-Finisher permits precision strike-off of material ahead of the Finisher. Thus, any excess or deficiency of material shows up while it is still easy to correct and the Finisher works under ideal conditions at all times.

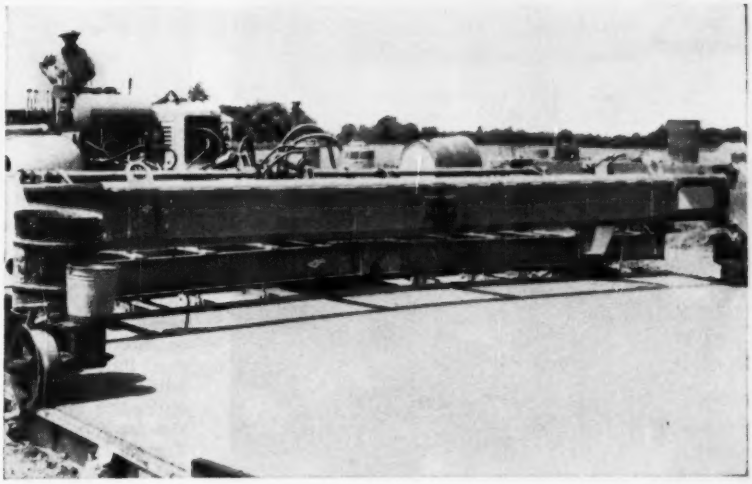
The fast, continuous forward progress maintained with this Jaeger paving team insures finishing each day's run immediately behind your paver. The saving in time and personnel, and minimization of hand work behind the machines, result in the lowest labor costs enjoyed today on highway and airport paving. Equally important, the slab produced by this Jaeger method of screw spreading and final finishing with suspended screed and float has a uniform strength and surface smoothness superior to pavements laid by any other method.



1: Rough strike-off **2:** Accurate screed strike-off **3:** Precision finish **4:** Ready for burlap and cure

DUAL HYDRAULIC SCREWS:
Remix and spread stiff concrete faster, easier, and more accurately than any other device. Operator merely "plays" hydraulic levers to control his independent right and left screws, speed up, slow down, reverse rotation and lift or lower. Easily handles largest paver production. Screw spreading, originated by Jaeger, also remixes and densifies the concrete and compacts it solidly against subgrade and forms, eliminating segregation and honeycomb and insuring highest uniform strength.

4-TO-1 CORRECTION AND THE FINAL KISS:
The Jaeger Float-Finisher can be towed by, and operated from, *any* make of finishing machine. Its narrow 6″ oscillating screed with hinged end shoes, and its 30″ wide float pan, are both suspended, making them independent of adjacent form level, and bogie front and rear axles provide a 4-to-1 ratio of correction. Smoothness specified for Interstate and State highways and U. S. Engineers airport paving is easily obtained. Separate engine and hydraulic system, mounted on the finishing machine, operate the screed drive and screed and pan lift on the Float-Finisher. Universal type quick-crown-change in both screed and pan adjust for *any* type crown with one turn of a lever. Machine can be detached in 2 minutes for moving or independent use of the finisher.



Now it's easy to lay flared and super-elevated slab on interchanges

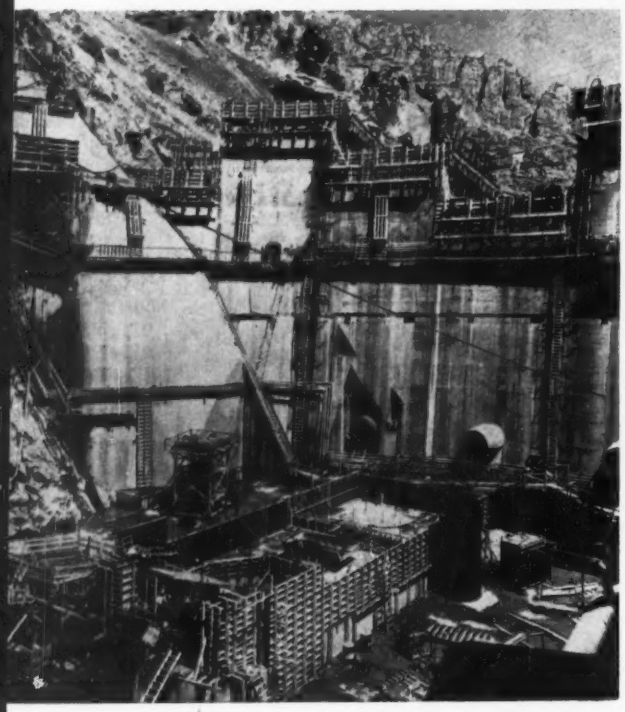
12′-18′ All-Hydraulic Spreader-Finisher has 6′ of infinite self-widening adjustability and diagonally adjustable quick-crown-change screed. Operator adjusts width setting of screw shaft as well as wheels to any flare in slab without stopping. Can also adjust its diagonal finishing screed to any angle needed to move material up-hill on super-elevated curves and finish solidly against the higher form. Screed crown can be raised or flattened by turning a ratchet lever. Dual hydraulic spreading screws.

12′-18′ All-Hydraulic Finisher can be supplied with same features of self-widening adjustability and diagonal rear screed, and quick-crown-change and infinitely adjustable end shoes on both screeds. No other machine offers equal advantages for finishing flared and offset widths, pitched slab, super-elevated curves or work requiring frequent changes of lane.

For complete catalogs and data on any of these machines, see your Jaeger distributor or write us.

THE JAEGER MACHINE CO., 800 Dublin Avenue, Columbus 16, Ohio

Construction 'Round the World . . .



In Iran

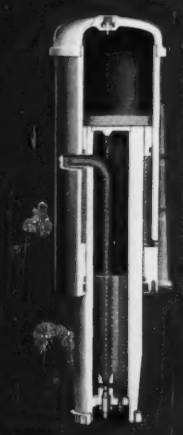
Karadj Dam and its powerhouse (foreground) rise in a gorge of the Karadj River near Teheran. Morrison-Knudson International Constructors is building the $45-million project, now 35% complete. It will provide the city with a firm water supply and another 110,000 kilowatts of electricity. At present stage, the dam is about 165 ft high.

In Canada

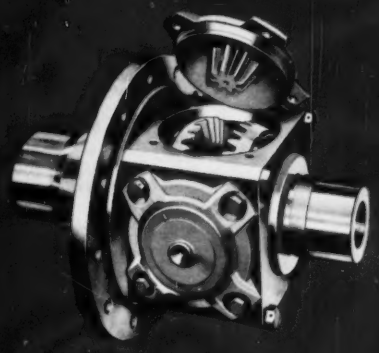
Underground steel skeleton takes shape for new 24-story building to serve as headquarters for Hydro-Quebec in Montreal. Crane lifts spoil bucket of earth (foreground) while a backhoe fills another bucket in the excavation. Included in the project, being built by Collet Freres, Ltd., of Montreal is a 450,000-kva underground substation.

In Sweden

Traveling tower crane erects formwork for one of three bridges that will link Swedish mainland with three principal offshore islands. The bridges, scheduled for completion later this year, are more than 3,000 ft long. Concrete anchor blocks at the foot of last two piers will support the concrete arches that will span the water.



HYDRAIR*



POWER-TRANSFER
DIFFERENTIAL

How these exclusive advantages

help you cut hauling costs...

DEEP V-BODY

LW Haulpak®

These 3 cost-cutting advantages..

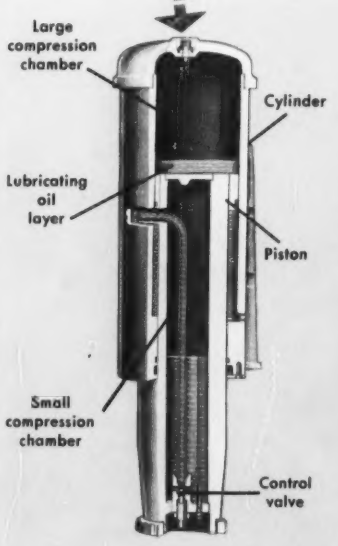
LW HAULPAK
Available in 3 sizes
22, 27 and 32 tons
290, 335 and 375 hp

1 HYDRAIR smooths rough haul roads

On LW Haulpak, you get a sturdy, simple air-hydraulic suspension system that eliminates the costly, time-wasting maintenance and repair of springs. Four Hydrair units cushion against loading and travel shock . . . compensate *automatically* for off-center loading and keep the load riding level over humps and holes.

Other Hydrair benefits:

Located high out of dust, dirt, and moisture, Hydrair cylinders permit higher ground clearance (23″) and sharper turning (Haulpak makes 180° turn in area only 44′6″ wide). The elimination of springs and conventional front axle also reduces non-profitable dead weight.



How this exclusive suspension system works

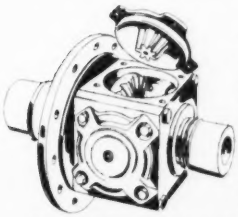
Basically, Hydrair operates like this: The upper compression chamber above the piston supports the load on a cushion of nitrogen gas and the lower compression chamber acts as a rebound chamber to snub the return or downward movement of the piston. The maximum stroke of the piston is 14 inches in the two front suspension units and as much as 7 to 9 inches in the two rear Hydrair units.

Conventional leaf springs have an "action space" of less than 4 inches, so it is easy to judge the tremendous improvement Hydrair represents as far as tire and vehicle life and operator comfort are concerned. Hydrair absorbs and cushions virtually all loading and travel shock, keeping this brutal punishment away from the tires, structure, and operator. Hydrair relieves the pounding on the road surface that creates "washboards".

..yours only in Haulpak

2 POWER-TRANSFER DIFFERENTIAL
pulls load through soft footing

This same exclusive LW differential has boosted production and cut costs for thousands of LW Tournapull® owners for more than 14 years . . . and now, *for the first time*, it is available on a truck. The power-transfer differential *automatically* puts power on the wheel with best traction, so you can haul through soft, slippery spots that bog down conventional haulers. The differential action also reduces wheelspin and tire wear.



The LW Haulpak differential works *automatically* at *all* times, is as simple in construction and as trouble-free as an ordinary differential. When one wheel tends to spin, idler pinions are automatically forced outward against friction surfaces. This slows the slipping wheel, and transfers up to 4 times its tractive effort to wheel on firmer footing. Neither wheel will spin independently until the 4-to-1 ratio is exceeded.

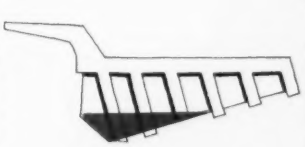
HAULPAK saves you money many other ways:

LESS MAINTENANCE (entire lube-check, needed only at 500-hr intervals, consists of just 3 easy-to-reach grease fittings). *POWER-MISER FAN* (cools with 20 to 25 less hp drain). *FOUR SEPARATE BRAKING SYSTEMS* (for fast stops with complete safety). *POSITIVE POWER STEER* (for faster turning, easier handling). *SIMPLE SIX-GEAR FINAL DRIVE* (compared to 12 or more usually standard). *BIG, ROOMY CAB.*

3 DEEP V-BODY gives you bonus tonnage within short wheelbase

Haulpak's exclusive deep V-body allows you to haul extra tons of material within a short wheelbase. Loaded material quickly fills all corners for big, low-void payloads. Deep "V" also provides a low center of gravity . . . gives Haulpak better stability on turns for high-speed hauling no matter how rugged the road.

In addition, the Haulpak V-body is exceptionally strong. It is constructed of high-tensile-strength steel . . . nearly 3 times stronger than steel commonly used in trucks, yet it weighs ⅓ less. Result: *You haul up to 30% more payload than Haulpak's weight.*



Bonus yardage in every Haulpak load rides in the exclusive V-shaped body. Low loading height (10'1") and large top opening (14'5" x 11") makes it easy for shovel operators to load Haulpak fast, without spillage. Heavy rubber pads provide 100% cushioning of the body against loading and travel shock.

HAULPAK LW 80...

offers new low in hauling costs,

80 tons, 100 yd capacity . . . speeds to 40 mph

Proved in strip mine operations, the 450-hp LW 80 hauls materials at lowest-cost-per-ton. Constructed of light, super-strong steels, Haulpak hauls more than 2 times its weight in payload! It is easier to handle and maneuver than 50-ton units of conventional design. Has many other profitable advantages. *Ask for complete information.*

This 80-ton HAULPAK performs at the Midland Electric Coal Company mine near Farmington, Illinois.

BIGGER PROFITS for you in well maintained haul roads

You can count on fast, low-cost haul-road maintenance when you use powerful heavy-duty LW graders. That's because LW graders work at higher speeds, complete jobs faster. Use them to build and maintain haul roads, level stockpiles and fills, improve drainage. LW graders last longer because of their 100% anti-friction drive and rugged one-piece main-frame. And you'll profit by the big 63-inch blade circle . . . the quick, easy moldboard tilt adjustment . . . rubber engine mounts . . . and full-sweep visibility. Seven models, 67 to 190 horsepower.

See color film "Revolution on Wheels"

In this 15-minute film you will see Haulpaks at work on highway construction, in copper and iron mines, and in rock quarries. You'll see why and how Haulpak moves more tonnage at big savings. Your LW Distributor will be happy to show you this film, "Revolution on Wheels".

Get complete facts on LeTourneau-Westinghouse equipment from your LW Distributor

Your nearby LW Distributor is ready, willing, and completely able to help you solve your hauling problems. He also handles LeTourneau-Westinghouse earthmoving equipment—Tournapulls, rubber-tired tractors, Rear-Dumps—and other lines of proven production tools. He is in a position to give you honest appraisal of trade-in equipment, and can assist you in obtaining helpful financing when it is needed.

See your Distributor, too, for dependable repair service and LW factory parts. You will be pleased with his prompt and efficient attention to your needs. Ask him to check your parts stock, and help arrange a schedule so his service department and yours can work together with greatest efficiency. You'll find your LW Distributor a good man to know. See him soon.

L.TOURNEAU LW WESTINGHOUSE

Litho in U.S.A. L.TOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILL. HP-2265-G-4

MAXON Dumpcrete Spreaders

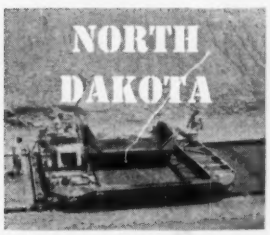
paid their own way in paving savings on projects across the country last season!

Central Contracting Company
Rapid City

C. F. Replogle Company
Circleville

L. Zimmerman & Sons, Inc.
Hillside

Wilson Contracting Company
New Castle



O. W. Swanson Construction Co.
St. Paul, Minnesota

Broman Construction Company
Clarion

Tufano Contracting Company
Babylon, Long Island

C. J. Langenfelder & Son, Inc.
Baltimore, Md.

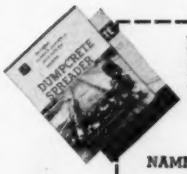
Here's proof of acceptance—proof that Maxon Dumpcrete Concrete Spreaders can sharply reduce paving costs with their "90-seconds-from-truck-to-slab" cycle. This is just a partial list of leading contractors who used the Dumpcrete Spreader last season. Most took full advantage of the benefits of central-mixing by using Dumpcrete Bodies... some used transit-mix trucks.

But the Dumpcrete Spreader paid off both ways. It can for you, too. It spreads, moves and strikes-off a 5½ cu. yd. load in *30 seconds*. (Dumpcrete Bodies load it in 60 seconds.) Places base course, top course or full depth. Paving widths are adjustable from 11 to 16 or 20 to 25 feet. Handles concrete of lowest slumps. Simple design and rugged construction hold maintenance to a minimum.

Find out how Dumpcrete Spreaders can cut costs for you on highway, street, runway or widening jobs. Send now for literature—or call your Dumpcrete distributor.

MAXON

Dumpcrete Hauling Bodies
and
Dumpcrete Paving Spreaders

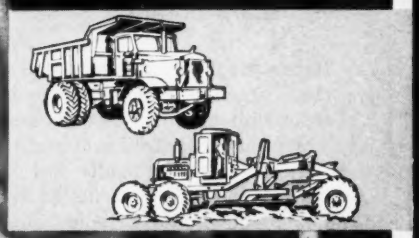


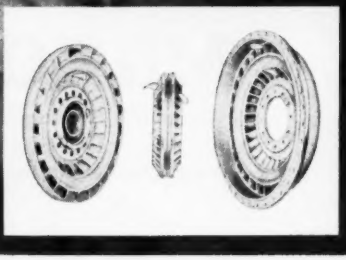
MAXON CONSTRUCTION COMPANY, INC.
Manufacturing Division C-1 • 2600 Far Hills
Dayton 19, Ohio

Please send me new Dumpcrete Spreader catalog with specifications

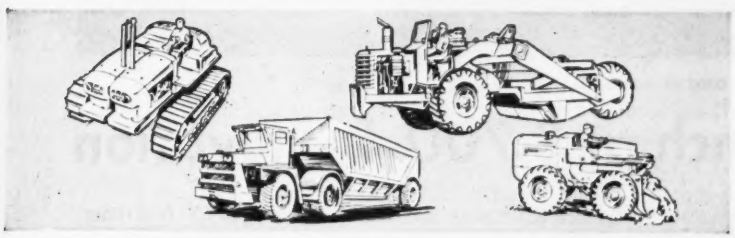
NAME_____
TITLE_____
FIRM_____
ADDRESS_____
CITY_____ ZONE___ STATE____

What's it costing





you to keep the "stick"



EVEN IF YOU HAVE only top operators on all your equipment, the cost of keeping a stick-shift comes to a pretty penny: too-frequent, high repair bills for unavoidably shock-loaded drive lines and axles—engines being overhauled twice as often as necessary at $1,200 to $1,500 per overhaul—and, of course, those incessant clutch repairs and replacements.

No Operator Matches TORQMATIC Efficiency—

—for no operator can handle the stick as smoothly and efficiently—*every* time—as an Allison TORQMATIC DRIVE.

TORQMATIC adjusts your engine output and speed—automatically—to meet every change in load or terrain. It never fatigues—no matter how long or how tough the job. It needs no costly training—in fact, TORQMATIC owners report they're saving between $1,500 and $2,000 every time they train a driver because rookies can't make a shifting or clutching mistake.

It's Working for You or Against You

So it's easy to see that a TORQMATIC DRIVE is a real money saver. One thing is sure: you're either cashing in on its advantages on every job you bid for—or competing against men who do, who bought TORQMATIC because they looked at *total* cost, not just *first* cost.

And remember—TORQMATIC is available in almost every type—and well over 100 makes—of equipment. It's been proved—on years of tough jobs—far beyond any other hydraulic transmission. Just see your dealer—or write Allison for details.

ALLISON DIVISION OF GENERAL MOTORS
Indianapolis 6, Indiana

In Canada: General Motors Diesel Ltd., London, Ontario

Allison TORQMATIC

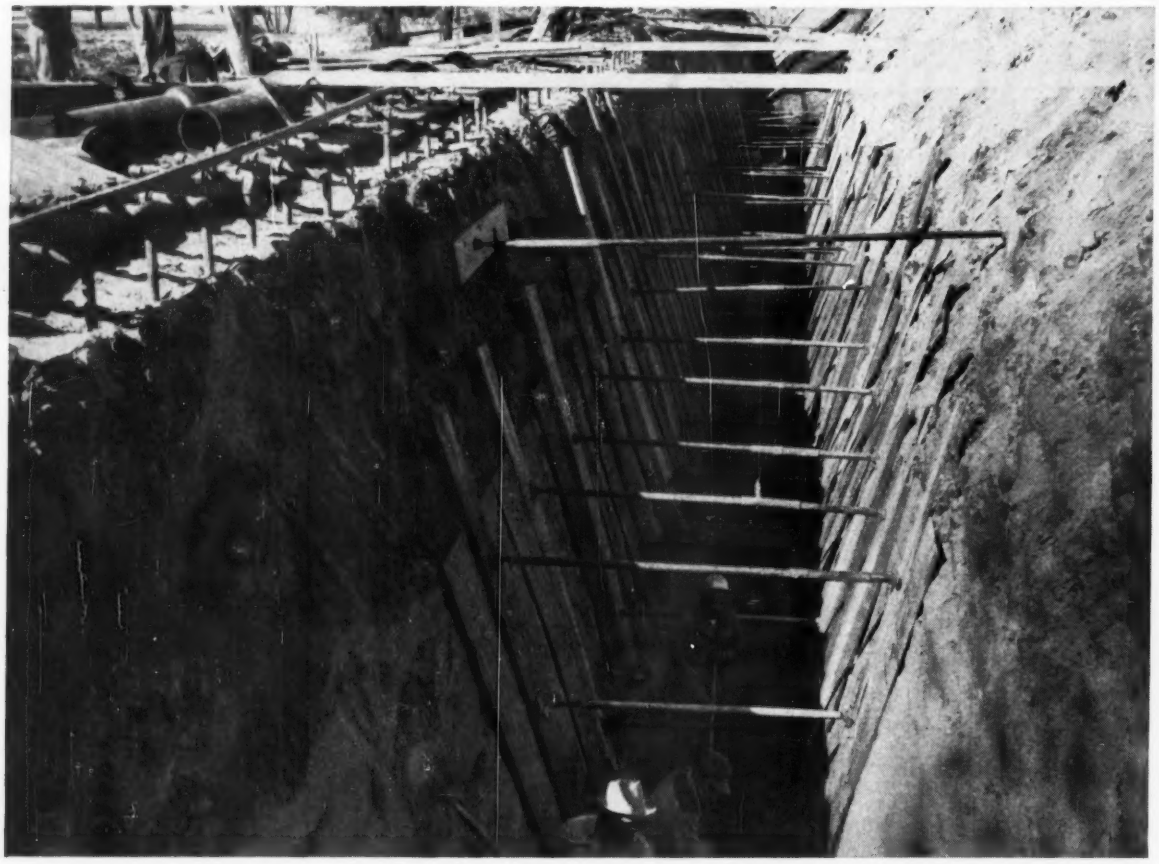
TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

Built stronger to last longer—Allison casts its converter for extra strength, greater precision—and the converter is *integrated* with the transmission for a neat, easily serviced installation.

HOW TO HANDLE WET JOBS

Project: Sanitary Sewers, El Paso, Texas
Contractor: T. N. O'Kelley, Utility Contractors, El Paso, Texas
Owners & Engineers: Public Service Board, El Paso, Texas



Wellpoints on 1 side perform unusual feat in coarse sand...

Dry 18-ft Deep Trench at 3,700-ft Elevation

At the reduced atmospheric pressure of 2/3-mile above sea level, any pump works at a handicap. To compound this problem, the contractor desired to install his wellpoint system (Griffin system) at ground level. Previous wellpoint practice in the area was to place the system on a berm nearer subgrade because of pump lift limitations.

• **Question:** in coarse water-bearing sand near the Rio Grande River, with discharge lines as long as 700 ft at times, could the necessary 18 ft lift be attained by a wellpoint system installed on only one side?

• Based on previous local experience it did not seem feasible, but events proved otherwise. Dry conditions were successfully maintained from the start, enabling T. N. O'Kelley to beat his 100-day time limit by 40 days.

GRIFFIN WELLPOINT CORP.

SALES • RENTAL • CONTRACT

GENERAL OFFICE: 881 East 141st St., New York 54, N. Y.

25th YEAR

BRANCHES: HAMMOND, IND. • HOUSTON, TEX. • NEW YORK, N. Y. • JACKSONVILLE, FLA. • WEST PALM BEACH, FLA.

In Canada: Construction Equipment Co., Ltd., Toronto • Montreal • Edmonton • Vancouver
In Venezuela: Drew Bear & Sons C.A., Caracas • Maracaibo

Construction Methods AND EQUIPMENT

JANUARY, 1960

VOLUME 42 • NUMBER 1

HENRY T. PEREZ, Editor

A Good Year Ahead

THERE ARE ENCOURAGING WORDS for contractors in the special report, beginning on page 115, that details the outlook for 1960. But, as you would expect, problems will arise that will prevent the construction industry from reaching its fullest potential.

Volume-wise the year will be great: Contract awards should be 6% above 1959 to make 1960 second only to the record year, 1956. With the exception of mass housing and public buildings all categories of work will show an increase.

Also sure to increase is competition, as new construction firms come into being and smaller companies grow larger. And this competitive pressure will continue to force the unwary—or unwise—contractor to the wall.

Construction costs will continue to go up. In 1960, however, the rise will be smaller than any in the past five years.

This slowdown in construction cost increases will not be due to any slackening in the wage push. Many long-term contracts already provide automatic rises in labor rates this year. And newly negotiated contracts will follow the pattern.

Also on the labor front will come increased push for more apprentice training programs, for changes in the legal status of secondary boycotts, and for extension of the minimum wage provisions of the Davis-Bacon Act.

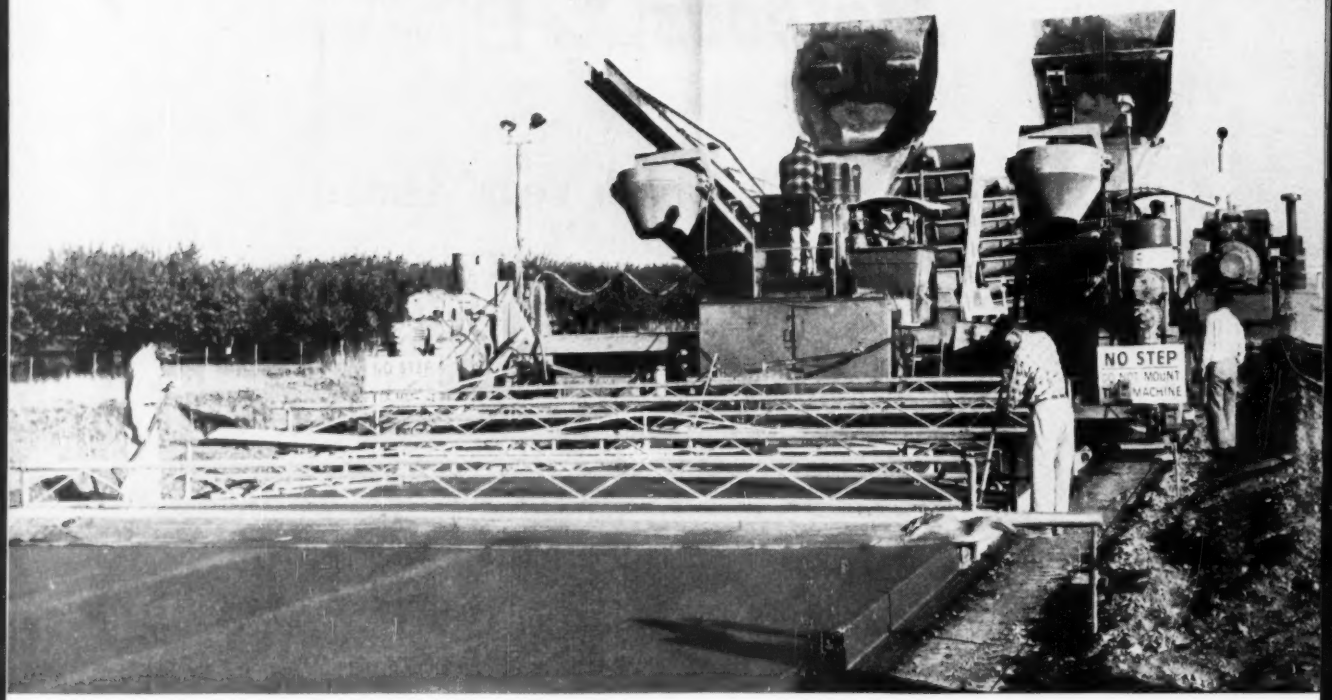
The AFL-CIO will continue to have serious internal frictions as the Building and Construction Trades Department battles the industrial unions over work assignments. A local of the United Auto Workers, for example, is building a laboratory for Ford Motor Co. And a subsidiary of a large construction contractor now handles all plant maintenance, formerly done by force account, for a paperboard manufacturer. Instances such as these will multiply.

In 1960 the art of construction will continue its steady advance, particularly in roadbuilding. This is due, in part, to modernized result-type specifications. And as highway specfications become more uniform from state to state, more efficient equipment and techniques will be developed to take advantage of them.

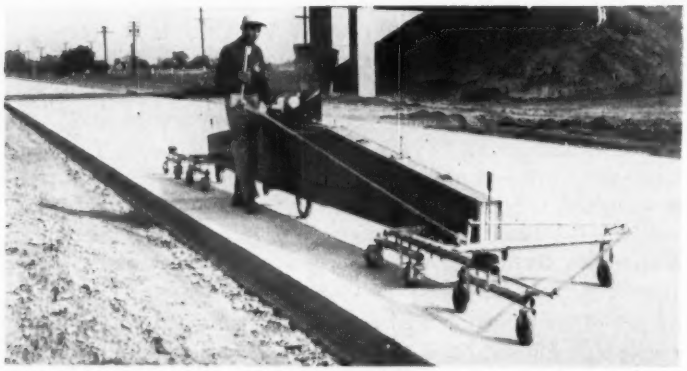
For all types of construction projects, machines available in 1960 will be more powerful, have higher capacities and increased mobility. Controls will be simplified and the operator given more comfort and visibility. While new rigs will cost more, they'll more than make it up in increased productivity.

So, on balance, 1960 will be a good year for the construction industry. But a good year for the industry does not guarantee prosperity for the individual contractor, of course. Only through imaginative planning, intelligent bidding, and alert execution can he prosper.

New Slipform Paver Meets



Toughest Specs?



With his slipform paver, Gordon H. Ball has to meet California's regular pavement smoothness specification that limits slab surface variation to ⅛ in. in a 10-ft straightedge. Also, profile variations cannot exceed the rate of 7 in. per mi in any 1/10-mi section.

The state measures smoothness with a profilograph (above). Pushed along the highway slab the day after paving, the 25-ft-wheelbase rig automatically records surface variations on graph paper. Pavement sections exceeding the allowable must be ground down. And if any consecutive 3-day average is above specification limits, work halts until the contractor substitutes new methods or equipment satisfactory to state engineers.

Ball's slipform rig passes these tough requirements while paving nearly 1,100 sq yd of 8-in slab per hr.

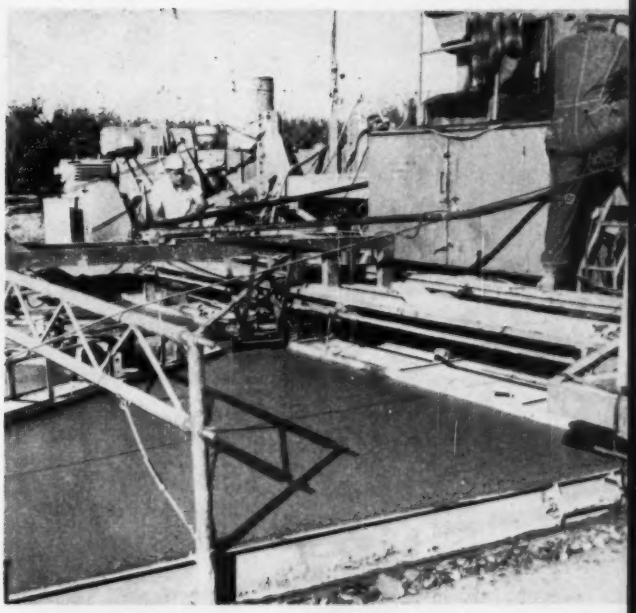
A SLIPFORM RIG originally developed to pave a flood channel in Los Angeles now is laying concrete highway slab near San Francisco. It's putting down a 24-ft width of 8-in. unreinforced pavement at a rate of better than 4,000 ft per 10-hr day. In addition, the unique paver inserts center-line tiebars and automatically cuts longitudinal and transverse weakened-plane control joints as it advances.

The slab the machine leaves behind it must meet California Division of Highways surface smoothness specifications (box). And these are among the toughest in the country. That the paver does meet them is a tribute not only to the rig itself, but also to the paving crew of Gordon H. Ball, general contractor from Danville, Calif.

Guntert & Zimmerman, Stockton, Calif., built Ball's slipform paver for Los Angeles's Griffith Co., who used it on a Corps of Engineers channel project. Since then, Ball has equipped the machine with jointing devices and is

Tight California Specs

GUIDE PROBES—Horizontal and vertical feelers fit over pre-set guide wire to adjust paver automatically to correct line and grade.



JOINT CUTTER—Vibrating plate between paver's second screed and final V-shaped float moves aggregates aside to make joint.

paving 19 mi of interstate highway with it at the town of Winters.

Like other slipform pavers, the crawler rig receives concrete in the front and extrudes it at the rear between trailing side forms. But there are important differences. One is that the machine carries a series of probes which, operating off pre-strung guide wires, automatically adjust it to correct line and grade. Another is that the rig is fitted with a traveling hopper that spreads concrete evenly across a trough for uniform distribution on the subgrade.

As with all slipform rigs, however, key to economical paving is accurate subgrade preparation. On the Winters work, Ball first builds up a 26-ft-wide soil-cement base for the 24-ft concrete pavement. With a grade accuracy of 0.02 ft and given a sprayed asphalt seal coat, the base makes a smooth, firm surface for batch trucks, paver-mixers, and slipform paver to operate on.

Along each side of the prepared subgrade stretches a 16 or 18-gage piano wire to guide the slipform rig. First a 200-ft length of wire is laid out on the grade, stressed by hand, and its ends anchored. Then, at 25-ft intervals, the wire is tautly stressed and accurately positioned by lifting it up onto stakes carrying notched supporting sleeves preset to exact line and grade by a survey crew.

Probes Guide Paver

Five U-shaped probes, or feeler gages, on the slipform paver fit over the guide wires; a vertical probe at the right front cover adjusting for line, a horizontal probe at each corner taking care of grade.

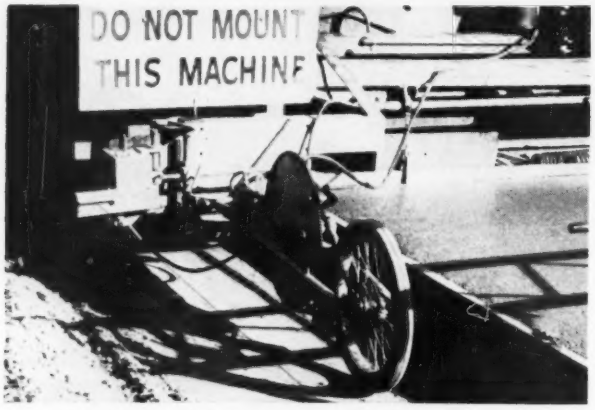
Also near each corner of the machine, and controlled by its matching horizontal probe, is a vertical double-acting 5-in. hydraulic ram. These support the actual paving apparatus to its crawler undercarriage.

Each probe contains a pair of sensitive limit switches. When the rig begins to vary from prescribed grade, one or more of the horizontal probes comes in contact with its guide wire. The contact touches off a limit switch connected to a solenoid valve to the appropriate ram. Thus the machine adjusts itself to get back on grade regardless of subgrade variations. For line, limit switches in the vertical probe vary the speed of the tracks, which are powered independently.

The formless paver receives concrete in a 1½-yd hopper car on the front. The hopper travels back and forth across the machine to spread the mix through an electrically operated gate. As the paver advances, a transverse vibrating tube consolidates the concrete between the rig's side forms.

The machine carries two screeds and a finishing float. The first screed is 80 in. long, the second is 24. Behind them, a V-shaped float imparts final smoothness. And a burlap drag attached to the tail end of the sliding forms textures the pavement surface.

continued on next page



TIEBAR INSERTER—Paver places ½x30-in. bars across center line on 30-in. centers. Workman twists bar into pair of parallel wires from reels at left. As paver advances, wires and rod move forward and down around idler to be held at mid-slab depth.

MEASURING WHEEL—Device pulled by left rear corner of paver measures spacing for transverse joints, which the rig makes automatically. At the right point, device trips hydraulic rams that push vibrating T-bar into concrete to make weakened plane.

The slipform paver also inserts ½x30-in. tiebars on 30-in. centers. These span the longitudinal center line of the 24-ft-wide pavement at mid-depth of the 8-in. slab.

For this operation, the machine carries a frame projecting forward from the front. In the frame are two reels of 14½-gage wire set about 24 in. apart transversely. At the front of the frame is a horizontal idler drum whose lower surface is 4 in. above subgrade. As the paver advances, it pulls two parallel wires from the reels, around the idler, and into the slab. The wires carry the tiebars, which a workman twists into them between reels and idler.

Ball's rig automatically cuts a weakened - plane longitudinal joint above the tiebars. This is done by a vibrating cutter bar of ¾x4-in. steel plate mounted between second screed and float. As the machine advances, the cutter vibrates aggregates aside. The following float smooths any surface disturbance, and a final Fresno trowel on the rig finishes the centerline joint.

The paver also makes weakened-plane transverse joints automatically. Attached to its frame is a pre-set measuring wheel that rides on the subgrade. When this measures that the paver has advanced the correct distance from the last joint, it kicks off two hydraulic rams. These push a vibrating T-bar into the fresh concrete in the space between the paver's two screeds.

The T-bar apparatus is mounted on longitudinal tracks within the paver. It remains in place, with its bar in the concrete, while the rest of the paver continues to advance. After the paver has advanced 12 in., the rams retract the bar and move forward in the machine to be ready to make the next joint.

The slipform paver is electrically driven. A General Motors 6-71 diesel engine on the machine spins a 100-kw Delco generator to furnish electricity. Part of this goes to a 10-hp U.S. motor that drives a 2,000-psi Cessna high-pressure pump for the paver's hydraulic system. The system is fully closed, with a dry nitrogen accumulator, so the pump only works when pressure drops.

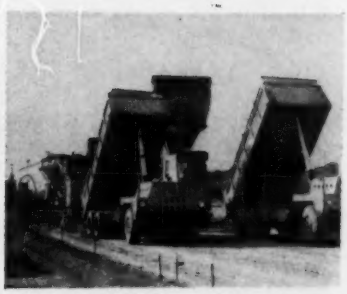
Some of the electric power drives the paver's crawler propulsion gear. Each track, 16 ft long and with 16-in.-wide shoes, is powered independently by a 10-hp Louis Allis motor. Rheostats regulate travel speed.

Fast Paving Speed

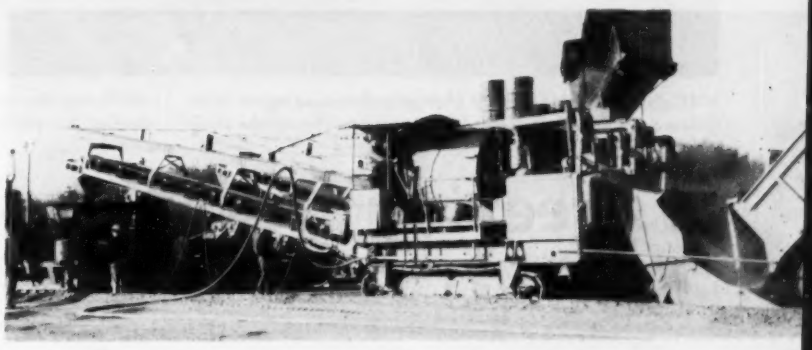
On the Winters job, maximum paving speed is greater than 7 ft per min. And the machine has laid 4,000 ft in a 10-hr day, to average 6 2/3 per min.

At that speed, concrete is in the 45-ft-long forms (15 ft inside the paver, plus two 15-ft trailing sections) less than 7 min. Yet the

BATCH PLANT—Noble plant, fed by Northwest clamshell and bulk-cement truck and trailer, deposits batches in haul truck. To limit hauls to a maximum of about 5 mi on 19-mi project, contractor first set up plant at one quarter-point, then at other.



SPECIAL HAULERS — Six-batch trucks, built for contractor by Cook Bros., feature Reo engines and air-operated gates for batch compartments. Truck driver trips gates from cab, thus eliminating the dump man.



PAVER-MIXERS—Two Koehring 34-E dual-drum machines furnish concrete to the slipform paver. Rig's booms carry 36-in. by 35-ft. belt conveyors instead of normal buckets. Contractor figures this method is cleaner, easier, and requires less maintenance.

machine leaves behind it a smooth-surfaced pavement with non-slumping sides and sharp corners.

One of the reasons for the high quality, the Ball people believe, is that the concrete is not worked over too much—it's just given simple vibration and screeding. Another factor is careful batching, especially of water.

Water/cement ratio of the mix ranges from 0.51 to 0.53 by weight. Cement, 5 sacks per cu yd, is Type II. Aggregate is a graded mixture with a maximum 1½-in. size, and this is uniformly saturated with water before being batched. The resulting concrete fed to the slipform paver has about a 2-in. slump and 4% entrained air.

Ball dry-batches the concrete from a Noble plant fed by a Northwest 95 clamshell. The plant discharges into special six-batch trucks built for Ball by Cook Bros. The trucks, 18 of them on the Winters job, are powered by Reo engines. And they have air-controlled gates between batch compartments so they can be operated by the truck driver from his cab, thus eliminating a dump man.

The trucks haul batches to the paving site and discharge into the skip of one of two Koehring 34-E Twinbatch paver-mixers. These ride the subgrade ahead of the slipform paver to feed mixed concrete into its hopper spreader.

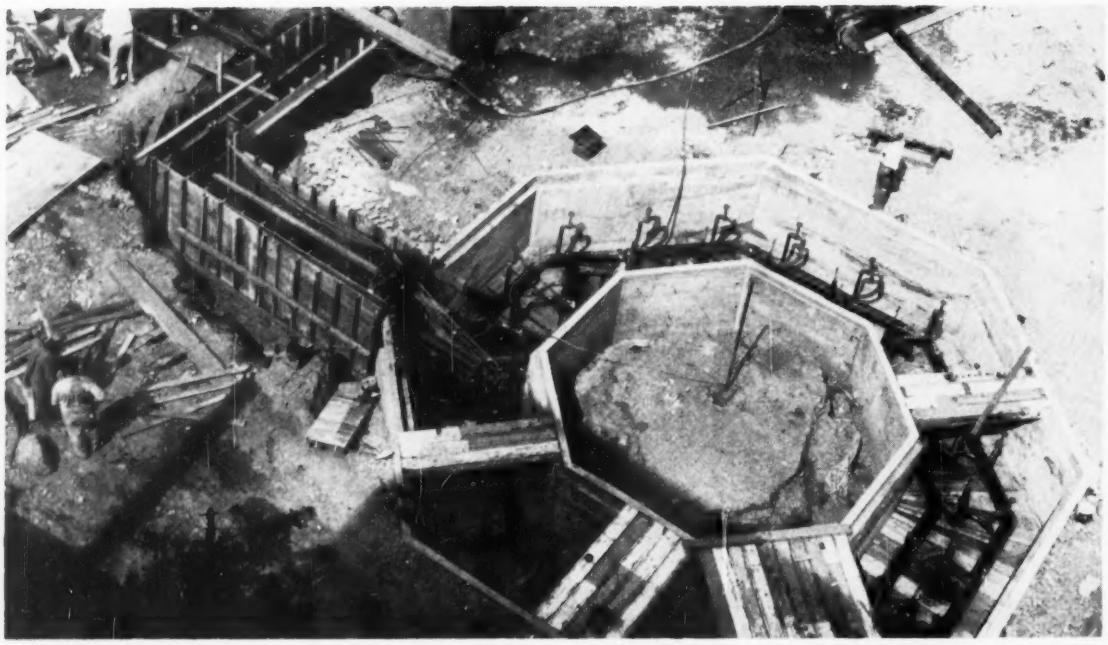
Discharge buckets on the Twinbatch machines have been replaced by 36-in. belt conveyors 35 ft long. A conveyor is cleaner and more easily controlled than a bucket, Ball people say. Also, with a bucket, the boom would have to be elevated to a 30-deg angle. Pulling the bucket up that hill would result in heavy wear and excessive maintenance.

How large a crew is necessary to operate a slipform-paving spread? Just what you'd need for an ordinary paving job, according to Ball. But, of course, the men's functions differ. At Winters, this is Ball's 13-man paving crew:

- *1 Slipform paver operator*
- *2 Oilers attending guide wire and probes*
- *1 Laborer inserting tiebars*
- *1 Laborer—miscellaneous*
- *3 Finishers edging slab and dragging burlap*
- *2 Paver-mixer operators*
- *2 Oilers on mixers*

This does not include a subcontractor's crew spraying Hunt's white curing compound on the completed pavement. Nor does it include Ball's truck drivers or five-man batch-plant crew.

On the 19-mi Winters project, Merrill Dubach is general superintendent for Ball, and Bill Appel is paving super. Harold J. Lopez is resident engineer for the state highway department on 14 mi of the job; George Demetras is resident on the other 5.



FREEZING SYSTEM—Coolant pipes extend from octagonal pipe gallery down to bedrock. Chilled brine circulates through the pipes and freezes the earth into a solid 40-ft-dia cylinder. A 14½-ft shaft will be sunk through the center and lined with 3 ft of concrete.

Freezing Keeps Deep Shaft Dry

Pumping out ground water to sink a 318-ft shaft was ruled out because of possible damage to nearby buildings, so the contractor is freezing the earth to keep the hole dry.

By JOHN SILINSH
Assistant Editor

FROZEN EARTH as hard as concrete is helping a contractor sink a 318-ft shaft in New York City. A refrigeration system circulates chilled brine through a ring of 21 pipes sunk into the ground and freezes the earth in the enclosed area into a solid cylinder. The frozen ground keeps the shaft dry and safe.

The pipes surround the area to be excavated and extend down to bedrock, a depth of 123 ft. As soon as the enclosed area was frozen solid, Poirier & McLane Corp. of New York City, started to remove the frozen material with jackhammers, spades, and a crane rigged with a clamshell bucket.

The frozen cylinder is about 40 ft in diameter. The shaft through the center of the cylinder is 14½ ft in diameter. It is lined with a 3-ft-thick wall of reinforced concrete to give a finished ID of 8½ ft. Excavation and concrete pouring proceed in lifts of about 20 ft each.

The shaft is in a congested area. The nearest apartment building is only 56 ft from the hole. Pumping out the ground water would have been the most obvious method of keeping the hole dry, but the city's Department of Public Works ruled this out because it might cause excessive ground water depletion and lateral displacements that could result in differential settlement and damage to the surrounding buildings.

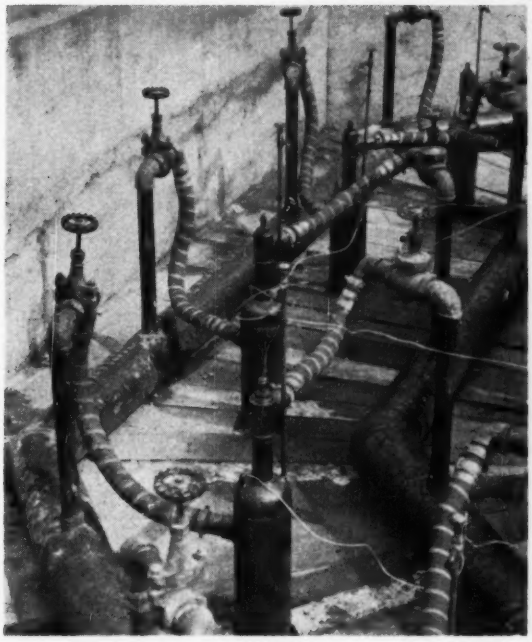
So the contractor turned to the technique of freezing the ground to keep the excavation dry and safe. The freezing method or shaft sinking has been employed in Europe for many years, but this is the first such application in the eastern part of the U.S. Winston Bros. Company of Minneapolis, experienced in the application of ground freezing, are the designers and consulting engineers on the freezing operation for the Manhattan shaft.

Only about one-third of the depth requires freezing. Ground consists of water-logged clay, silt, and unconsolidated fill. Below this is solid bedrock that does not present any unusual problems to the shaft sinking.

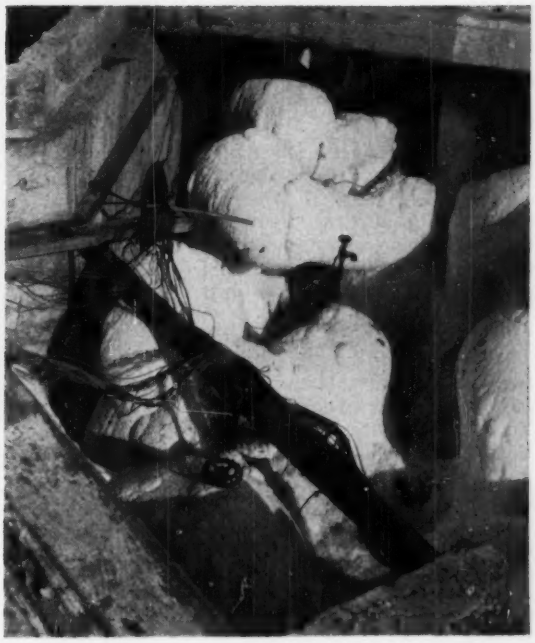
With the freezing method, pumping equipment is at a minimum. Once the ground is frozen, the shaft remains dry for the duration of the work. No pumping is necessary during the excavation.

The $6.5-million shaft is part of the Newtown Creek Pollution Control Project undertaken by the City of New York at an estimated total cost of $118 million. The new system will eliminate 78 sewers now emptying into the Hudson and East Rivers.

When finished, the shaft will collect sewage from a number of interceptor sewers. Pumps will force the sewage down the shaft and through a tunnel under the



COOLANT PIPING—Supply and return headers, connections to pipes, valves, and thermocouple leads are in octagonal gallery.



DEEP FREEZE—Moisture from the air and rain water build up a thick layer of ice during the continuous freezing operation.

and Holds Dirt in Place

East River to a new 310-mgd treatment plant.

Drilling

To freeze the ground, the contractor set up an extensive refrigeration system. Part of this is the ring of freeze pipes sunk into the ground by drilling. At the bottom, the pipes are collared about 10 ft into solid bedrock

Two rotary drill rigs handled the pipe sinking. One of the rigs was a Failing; the other, a Mayhew truck-mounted drill. It took about 10 weeks to complete the drilling. The Pennsylvania Drilling Co. of Pittsburgh was the drilling subcontractor.

A high degree of accuracy in drilling had to be maintained to assure that the enclosed area would be completely frozen. Usual vertical deviation tolerances for drilling are in the range of 4 to 5 deg, but on this job a vertical deviation of ½ deg had to be maintained.

Continuous collars on the drill stem and frequent checking of inclination and direction with a Sperry-Sun surveying instrument helped maintain the high accuracy. Pressure on the 8-in.

DRILLING—A high degree of drilling accuracy is necessary because the freeze pipes must be spaced uniformly around the circle to insure proper freezing of the entire area.

FREEZING KEEPS SHAFT DRY . . . *continued*

drill bit was kept at a minimum to avoid forcing the drill out of line.

In addition to the 21 freeze pipes on the circumference of the circle, one perforated pipe was installed in the exact center of the shaft. Brine does not circulate through this pipe, but temperature readings are taken in it.

Freezing

While drilling was in progress, two packaged ammonia brine cooling systems were installed. York Div. of Borg-Warner Corp., York, Pa., designed, built, and installed the refrigeration units and all accessories. Each unit consists of one 12-cyl 125-hp reciprocating compressor, one 16-in.-dia condenser, and one 24-in.-dia brine cooler. Both the condenser and brine cooler are 16 ft long.

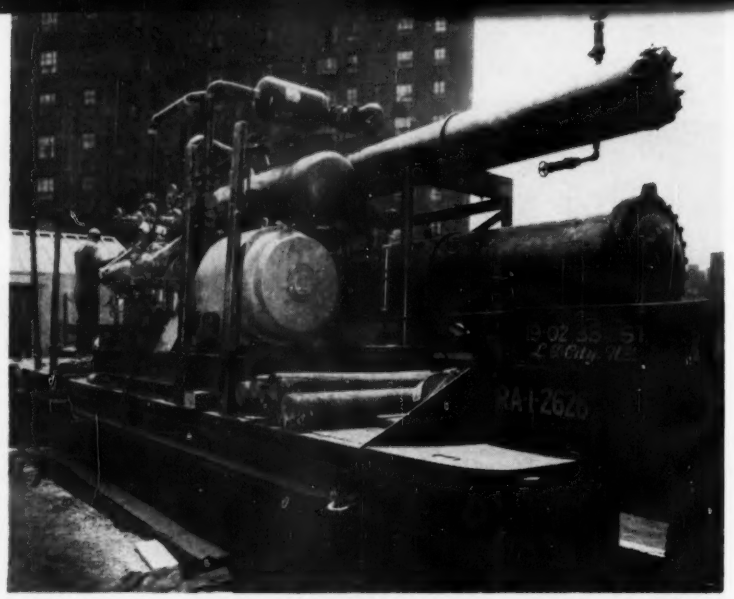
The refrigeration system supplies chilled brine to each pipe. Specific gravity of the brine is 1.265; its freezing point is -32 deg. Both refrigeration units work continuously. While the design capacity of the system is 110 tons per day, actual output at the start of the freezing was somewhat higher and decreased about 25% as the freezing progressed.

Because the freezing equipment is not installed permanently, it was designed with resale in mind. Each of the platform-mounted, packaged refrigeration units is capable of freezing a standard 85 x 185-ft skating rink.

The freeze pipes are 6 in. in diameter (schedule 40 seamless steel pipe). A 2-in. pipe in the center extends to within 18 in. of the bottom of each freeze pipe. Chilled brine is pumped down the 2-in. pipe and returned between the exterior and the interior pipes.

Brine picks up heat from the ground as it returns to the suction header and to the chiller. There it is chilled again and pumped back to the supply header and to the freeze pipes. Total capacity of the pumps is 770 gpm.

Supply and return headers as well as the tops of the freeze pipes and the valves and connections to the pipes are located in an octagonal concrete pipe gallery. The supply header forms the smaller of two octagons inside the gallery. Flexible hoses, 2 in. in diameter, connect the supply header with each of the 2 in. input pipes.



FREEZING UNITS—One of two York packaged refrigeration units is delivered to job site. When the job is completed, they can be resold to freeze standard size skating rinks.

The return header is the outside octagon within the pipe gallery. Again, 2-in. flexible hoses tap off the side of the 6-in. pipes and return the brine to the header.

A valve in each supply and return connection can be adjusted independently to regulate the freezing in such a way as to insure uniformity.

A bleed connection for each freeze pipe consists of a small pipe with a valve. It is opened periodically to remove any air that might have accumulated in the top of the pipes. Presence of air in the freezing system air locks the circulation and reduces the freezing effect of the brine.

In addition to the refrigeration units and the ring of brine pipes, the freezing system also includes a surge tank. It insures an adequate supply of brine at all times. A gage on the surge tank serves as a check on the brine supply. In the event of a break in the piping system or the freeze pipes, a rapid drop of brine level in the surge tank would act as an alarm.

Temperature Control

A complex temperature measuring system keeps close tabs on the operation of the various parts of the freezing setup. Thermocouples in the top and bottom of each freeze pipe and at 10-ft intervals in the center pipe measure the temperature. Brine flow into each of the freeze pipes is adjusted so as to maintain the proper freezing burden on each freeze hole.

Thermocouple readings are taken with a potentiometer every 4 hr. All of the thermocouple leads are connected to a control board in the building that houses the refrigeration units. The board contains three switches and a potentiometer that reads to 0.1 deg.

The switches select the thermocouple to be read, and the potentiometer indicates the temperature at the thermocouple in question. An accurate record is kept of all temperature readings.

As the freezing operation starts, small cylinders of frozen earth surround each freeze pipe. These cylinders increase in size until they overlap and eventually encircle the entire area.

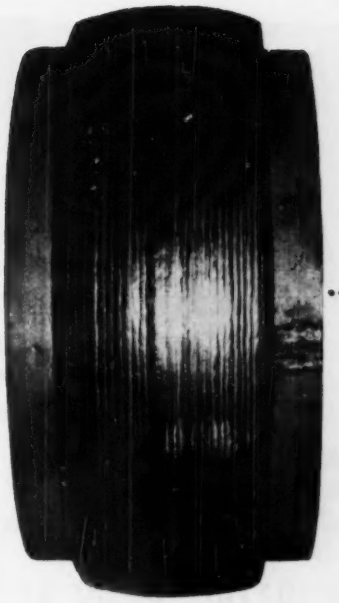
Closure occurs when the ground at the periphery reaches a frozen state. The time of closure can be predicted quite accurately from a graph of the temperature readings taken in the center hole.

After the solid circular ice wall is formed, the enclosed area starts to solidify from bottom up. The unfrozen ground is in a cone shape with the point at the bottom. Eventually, the whole area becomes a solid cylinder.

To determine the exact time of closure on very deep holes, the center pipe is capped and a pressure gage installed in the top. Pressure readings are taken frequently. A rapid rise in the pressure indicates that closure has occurred.

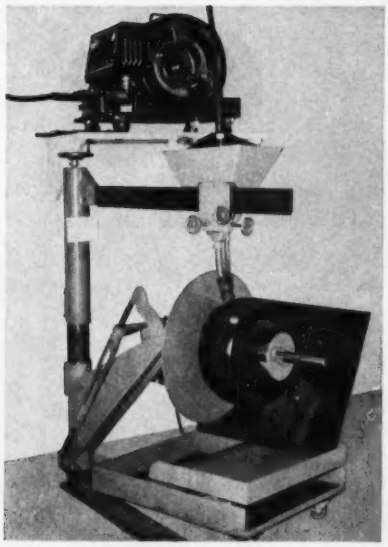
After closure, the ground in the center has a tendency to expand. Also, all unfrozen water

SHOVEL ROLLS
better than new



Shovel roll as rebuilt with Stoody wires.

when rebuilt and hard-faced
with **STOODY ALLOY WIRES**
... by either Automatic or Semi-Automatic Welding



Semi-automatic welder with positioner.

Don't throw worn shovel rolls and similar parts on the scrap heap! Rebuilt and hard-faced with Stoody alloys, such parts are as good or better than new—at a fraction of replacement cost.

Rebuilding is fast... by the semi-automatic or the full automatic welding processes. With the semi-automatic welder a simple positioner is used as shown at the left. The welder is a versatile machine that can be used either with the positioner or manually in the usual way as illustrated below. Investigate the semi-automatic; it does more work in less time, reduces replacements, soon pays for itself.

Your Stoody dealer will be glad to direct you to custom automatic shops or to demonstrate the semi-automatic in your own shop. Run the machine yourself... test it on your own rebuilding and hard-facing jobs.

See the "Yellow Pages" in your phone book for your local Stoody dealer or write for his name and address. Completely illustrated folders on all Stoody wires are available.

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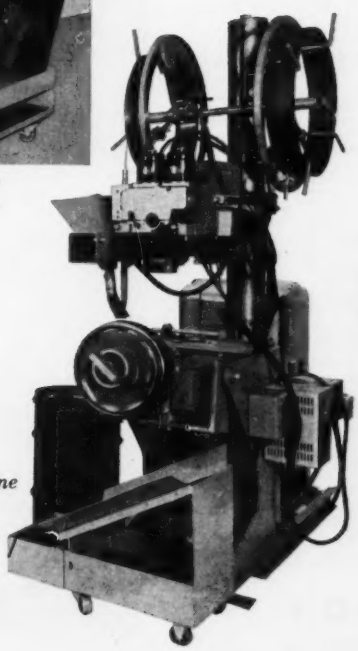

Automatic welding machine rebuilding a shovel roll.

Typical manual semi-automatic operation, open arc.

"K&M" ASBESTOS-CEMENT SEWER PIPE

INFILTRATION-PROOF AT 25 PSI PRESSURE

Tests prove that the exclusive, patented "K&M" FLUID-TITE Coupling maintains a permanently infiltration-proof seal under severest field conditions.

This is true even when "K&M" Asbestos-Cement FLUID-TITE Sewer Pipe is under deflection, or is buried at various depths under heavy backfill. Tests prove this infiltration-proof pipe can withstand 25 psi external water pressure.

In addition to its tight sealing, "K&M" Asbestos-Cement FLUID-TITE Sewer Pipe is non-corrosive and completely immune to electrolysis. Its bore—with a Manning Factor of n-0.010—remains smooth and clean for full, unobstructed flow.

That's why there's a minimum of maintenance with this hardy pipe. It reduces treatment loads and costs. Requires fewer periodic inspections and cleanings.

There are five classifications of "K&M" Asbestos-Cement FLUID-TITE Sewer Pipe to meet your crushing strength requirements. To simplify planning and design.

Eliminate the problem of infiltration with tested and proven "K&M" Asbestos-Cement FLUID-TITE Sewer Pipe. Write to us today.

5 CRUSHING STRENGTHS OF "K&M" ASBESTOS-CEMENT FLUID-TITE SEWER PIPE

Size Inches	Class 1500	Class 2400	Class 3300	Class 4000	Class 5000
6	1500	2400	3300		
8	1500	2400	3300		
10	1500	2400	3300	4000	5000
12	1500	2400	3300	4000	5000
14	1500	2400	3300	4000	5000
16	1500	2400	3300	4000	5000

K·M
BEST IN ASBESTOS

KEASBEY & MATTISON
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ICE CONCRETE—The frozen ground is as hard as concrete and requires air tools to loosen it for excavation. The shaft sinking proceeds to bedrock in six 20-ft lifts.

within the frozen ring is forced toward the center and up the pipe. When closure occurs, the pressure in the center pipe may increase very rapidly. At that time the pipe is uncapped and the water is bailed out.

On the relatively shallow Manhattan shaft the center pipe was not capped. When the temperature readings indicated that closure had occurred, the excess water was bailed out from the center pipe. Eventually, even the water left in the pipe froze.

Excavation

Poirier & McLane were able to start excavating after 80 days of freezing. But things didn't go smoothly very long. A few feet below the surface they hit an old foundation—most likely an old pier on the East River. To remove the dirt for the first lift, they had to cut through the old concrete foundation and a timber pile cap below it. In addition, they had to remove several 30-ft-long timber piles.

To get rid of the pile cap they used a pneumatic sinker with a spade attachment. An Ingersoll-Rand Gyro-Flo compressor supplied the air. With this equipment they cut through the timber near one side of the shaft. Then a Northwest truck crane with a clamshell bucket removed the pile cap.

Before the actual excavation started, the contractor expected the frozen material would require drilling and blasting. An Ingersoll-Rand Crawl-IR drill was brought out to the job site. The rig is just small enough to be lowered through the 8-ft 6-in. ID shaft.

But they didn't need the drill. Instead, Poirier & McLane crews are using air tools to loosen the frozen material and a clamshell to remove it. As the excavation proceeds downward, sections of the center pipe are cut off and removed.

Concreting

They excavate for one 20-ft lift of shaft lining at a time. Then come two layers of reinforcing. One layer of steel is near the outside of the wall, the other near the inside. The 1-in.-dia vertical and circumferential bars are tied in place on 8-in. centers in both directions.

On the first lift Poirier & McLane were able to speed up the

REINFORCING—Steel bars for the shaft lining are lowered into the hole one at a time and tied in place. Crews space the 1-in.-dia bars on 8-in. centers in both directions.

STEEL BASKET—The inside ring of reinforcing for the first lift is prefabricated on the ground, then lowered into position. All other reinforcing is tied in place.

steel work by tieing the inside layer on the ground and lowering it into the hole as a basket. This could not be done for the other lifts because a prefabricated basket would not fit through the finished shaft.

In addition to the 3-ft-thick shaft wall, there is a bell-shaped bearer at the bottom of each lift. The shaft wall and the bearer are poured integrally. The bearer extends 3 ft beyond the outside of the wall at the bottom and tapers upward to a point 5½ ft above the bottom of the lift. The portion of the shaft above bedrock contains a total of six of these bearers.

Steel concrete forms follow the reinforcing. They are built by Concrete Accessories Corp. of Zelienople, Pa. Four sets of forms are being used on this job. Each set is made up of four sections 5 ft deep.

A set of dummy forms is used for a false bottom on each lift. The 3-ft 8-in. dummy forms are centered in the bottom of the shaft, and the area inside the forms filled with sand. Wood keys rest on top of the sand. They form grooves in the bottom of the concrete and lock successive lifts in place. The sand is removed after each lift is poured.

Last to be put in place before concreting a lift of lining are pipes for utilities. A 12-in. vent pipe, a pipe for water, and one for air are imbedded in the concrete between the two layers of reinforcing steel. Several thermocouple pipes are also imbedded in the concrete, but they are outside the reinforcing. Thermocouples in these pipes will give the temperature of the concrete as it cures near the frozen wall.

At last comes the concrete. Straight portions of the shaft wall contain about 4 cu yd of concrete per vertical ft of shaft. The concrete mix is designed for a strength of 3,500 psi.

After the shaft has been sunk to bedrock by these procedures, freezing will no longer be necessary. Then the job will become an ordinary shaft sinking operation in rock. In this portion, the shaft wall will be only 12 in. thick.

END OF LIFT—Transit-mix concrete shoots down the pipe to complete a lift. The 3-ft-thick wall contains about 4 cu yd of 3,500-psi concrete per vertical foot of shaft.

Men on the Job

Consulting engineer for Winston Bros. Company on the freezing operation is Charles P. Gail of Painesville, Ohio. Donal F. Ballou represents the York Corp.

Poirier & McLane's staff includes John Decker, project manager, U. Serra-Zanetti, project engineer, and Andy Amisano, general superintendent. Herbert Dallmann is assistant superintendent in charge of the Manhattan shaft. Their mechanical engineer is Elmer Nelson.

The entire project is under the dircetion of Public Works Commissioner Frederick H. Zurmuhlen of the City of New York. Leo Magid is chief of the Bureau of Sewage Disposal Construction.

Resident engineer for the city is Henry G. Vermont, and Donald H. L. Brittain is assistant mechanical engineer.

New machines, new ideas

5 Michigan Tractor Scrapers and a 600 hp Michigan Tractor Dozer, on Southwest Interstate job, move 8,750 tons daily

Some new equipment and some unusual techniques are helping M. M. Sundt Construction Co., Tucson, Arizona, get an important 20% increase in production.

The new equipment includes *five* 375 hp, 29 yd Michigan Tractor Scrapers and a big *600 hp*, 104,000 lb, Model 480 Michigan Tractor Dozer. The Scrapers are being push-loaded by the Dozer with an average of *35 tons in 35 seconds* . . . this weight is extremely accurate since *each load is being weighed*, according to Arizona state regulations, by a state representative on a truck-type platform scale.

Borrow sprinkled 7 days

The unusual techniques were developed to speed dirtmoving and to more easily meet strict compaction specs. For

On this job, all loads are being scale-weighed. Records show faster, easier-loading Michigans are moving 20% more paydirt per day than similar-sized pans formerly used. Owner Sundt (left) also likes Michigan "design simplicity, ease of operator training," plus "best service I've ever seen, both from factory and dealer." Distributor is Western Machinery Co, Phoenix.

600 hp Michigan Dozer heaps 29 yd Michigan Scraper in 35 seconds.

increase production 20%

example, before digging starts, the dry, sun-baked borrow area is laced with perforated pipe. Water sprinkles out night and day for about a week. Once the soil is saturated seven to nine feet deep, Sundt turns off the water, removes the pipe, brings in his earthmoving machines. Pre-wetting, say men on the job—a 5.3 mile, $1,031,000 section of Tucson-Benson Interstate Highway—makes for easier loading. It also has eliminated the clutter of water wagons and motor graders and extra sheepsfoot rollers which previously kept scrapers waiting in line to unload.

Success with Michigan Tractor Shovels prompts purchase of Scrapers, Dozer

Both the Michigan Scrapers and Michigan Dozer arrived on this job in mid-contract. "It wasn't that we were doing badly with our existing scraper-pusher fleet," explains Don Kellogg, Sundt's equipment supt, "it's just that we thought we could do better. We had excellent experience with Michigan *Tractor Shovels*, and so, because they have the same power train design, expected the same results with Michigan Scrapers and Dozers. We got 'em too. Moving 119,500 yds roadway excavation, 644,100 tons of borrow, 242,400 tons select and 49,000 tons aggregate base, we should finish 30 days ahead of schedule, *without changing our work day!*"

Higher scraper production is one reason, of course. Less downtime is another. "And good visibility," Ferris Ray, project manager, points out, "has reduced waste time. Scraper and Dozer operators can always see each other. No one has to blow horns or ring bells or stand up. Just a few simple hand signals coordinates all work.

Load at 7½ mph

"Scrapers load the 2800 lb/yd silty caliche mixture in second gear (7½ mph). They power-shift instantly to third (15 mph) as they're shoved off . . . move to and from the fill at speeds up to 30 mph . . . positively eject all loads." The result is 50 two-mile cycles *per Scraper* per 8-hour shift . . . 8,750 tons total . . . 20% more paydirt then previously moved by same size fleet of another make.

"The Monster"

The Michigan Model 480 Tractor Dozer is proving a remarkable pusher. The men have dubbed it The Monster. "It sure has power!" says Clay Smith, operator. "It loads these big Scrapers fast (usually in second gear 7½ mph) . . . backs up fast . . . goes from one borrow area to another fast (15 to 28 mph).

"In fact," continues Smith, "there isn't much this Dozer can't do fast. I've trimmed on 2-on-1 slopes and push-loaded on a 2-to-1 slope. I'll admit I wasn't too happy when I was told I had to run the Model 480. I'd been a crawler man for years. But I sure changed my mind! The power-steered, power-shifted 480 is much easier to run—in fact, when I climb down off the machine at the end of a day, I'm still rarin' to go."

Built-in scarifier

Where borrow is tight and tough, an optional Model 480 attachment, blade-mounted scarifier teeth boost production. When dozing or pushing forward, these teeth fold up, out of the way. But on return operator drops blade, teeth jut out and rip 8 inches deep . . . just right for the next scraper pass.

Michigan units like these are helping dirtmovers all over the country boost production. Three Scraper models—10½, 19, 29 yds—four Dozers—162, 262, 375, 600 hp—are now available. Your Michigan Distributor will be glad to show them to you.

Michigan is a registered trademark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK EQUIPMENT

2403 Pipestone Road
Benton Harbor 30, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

Michigan rubber-tired dozer prevents job shutdown

Haul trucks bogged down until Model 280 arrives to spread fill and compact in one operation

Push-loading a fleet of five 15 yd scrapers, the Model 280 boils 'em over in only 45 seconds.

When a Michigan Model 280 rubber-tired Tractor Dozer was put to work on the Rieth-Riley Construction Co job near South Bend, Indiana, filling and compacting problems—which threatened to close the job—were solved.

It was early spring. This Goshen, Ind, firm was working on a $1,000,000 contract, building part of a new four-lane divided highway to bypass South Bend. Yardage totalled 644,000 cu yds, mostly clayey sand. Trouble started when pockets of wet glacial clay were encountered at the borrow pit. Then it snowed and the material became even more unstable. The dozen 10 yd trucks hauling onto the fill were continually bogging down. A 10-ton, 3-wheel roller couldn't compact fast enough and a pair of 200 hp crawlers couldn't spread fill and pull out trucks too. The job was near a standstill.

At this point, Grade Foreman Truman "Cannonball" Condra thought it might be a "good idea" to try a mobile high-speed Michigan Tractor Dozer. Michigan Distributor, Deeds Equipment Co, brought out a 262 hp Model 280.

Michigan performs dual role

Half a day's work with the Model 280 unsnarled the tangle. The key was speed. The fast rubber-tired rig could assist trucks when they bogged down and still have time to spread material across the length and 250 ft width of the fill.

Compaction: 95% in normal dozing

Later, an even more amazing thing began to happen. As the day wore on, trucks no longer became mired in the unstable material. The Model 280 with its big hydroflated 29.5 x 29 wide-base tires and working weight of 56,000 lbs, was compacting fill so well the trucks could get through. Moreover, in the *normal course* of its dozing job, required compaction was being attained by the Michigan alone . . . compaction which equalled the state specification of 95 to 100% Proctor.

Handles fill work too

So, trucks got through and the job was kept open. The Michigan Model 280 handled the spreading of fill and compaction for 12 trucks—3,000 pay yds per 10 hr day. The two crawlers were put on standby. Track costs, a major problem in the sandy material, were eliminated. The roller was retired.

Spreading scraper-dumped fill 500' takes the Michigan only 45 seconds. Return, in fast reverse, takes 25 seconds.

Production jobs all over the grade

In later weeks, as weather and soil conditions improved, the Michigan's versatility, power and speed paid off even more, both on additional production jobs and odd jobs. On construction of the main interchange, for instance (a fill 47 ft deep with grades up to 2 to 1), the 262 hp Model 280 dozed 5,000 pay yards per 10 hour day, per cross-section measurement. On push-loading assignment—working with five 15 yd scrapers, the Model 280 loaded each to spill-over in only 45 seconds. Spreading scraper-dumped material also took an average of 45 seconds over a distance of 400 ft. With up to 28 mph reverse, back-up "dead head" time here usually amounted to less than 30 seconds.

"Right there" for emergencies

The Michigan's 28 mph speed permitted runs from one end of the two mile job to the other for handling such emergencies as starting stalled equipment, pushing loaded scrapers over hills and pulling out bogged-down trucks. It came in handy when repair work was called for. The high blade lift made it possible to "pull out" engines and power-train components for repair, making it unnecessary to call in an A-frame truck. The Michigan also back-filled drainage structures . . . in less than two hours overtime it could complete 10 or 12, each structure taking only 10 to 15 minutes.

In summary, the Model 280 did production work wherever used . . dozing, shaping, rough grading, compacting, push-loading. It needed no planks when traveling over railroad tracks or concrete and it could quickly run around to handle emergency situations. When the bulk of earthmoving was completed, the Model 280 was kept on to complete the finished grading before paving began.

Grade Foreman Condra put it this way, "I won't say our Michigan will do everything, but I am convinced we can't get along without it." Maybe *you* "shouldn't get along without a Michigan Tractor Dozer" either. Why not call us for an on-the-job demonstration. Choose from any one of four sizes—162, 262, 375, and 600 hp. No obligation.

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Construction Machinery Division

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2403 Pipestone Road
Benton Harbor 18, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

New method cuts man hours in half

Demolition costs substantially reduced as small Michigan Tractor Shovels release usual hand crews for other work. Rigs start 12 stories up, work down.

By using three 16 cu ft Michigan Tractor Shovels, Drachman Demolition Co, Inc, New York, was able to cut normal man-hour requirements in half and finish salvage and demolition of two 12-story Park Avenue apartment buildings in slightly more than six months. By eliminating much hand labor, experienced men were released for other phases of demolition work.

Job calls for new methods

The economics of the operation, and the time element, called for modern materials handling techniques where formerly handwork was employed. Officials of the firm reasoned that small, agile Tractor Shovels would fill the bill. Three Model 12B's, smallest of the eight models in the Michigan line, and one competitive unit of smaller dimensions were selected.

Two Michigans started at the 12th floor of one 200′ x 80′ building. The third Model 12B and the competitive unit went to work on the other. Crews inside the walls, and outside on steel scaffolding, worked with pneumatic hammers leaving several feet of exterior wall as a backstop for the Tractor Shovels to work against. Debris was picked up and dumped through floor openings to a hopper on the 5th floor. This fed timber chutes for direct loading into trucks.

Up to 1½ tons per Michigan load

Drachman Job Supt, Ed Brown, says, "The Michigans out-performed the other make by getting bigger loads faster." These compact machines, with their overall height of only 5′ 3″ and a turning radius of 6′6″, proved ideal in the cramped quarters. The hydraulically operated 16 cu ft bucket with 3,000 pound lift capacity handled the broken

bricks and concrete with ease. The 44 hp engine, torque converter, power shift transmission, and speeds up to 11.2 mph enabled the Michigans to scoot around and accomplish their jobs with amazing speed.

Going Down!

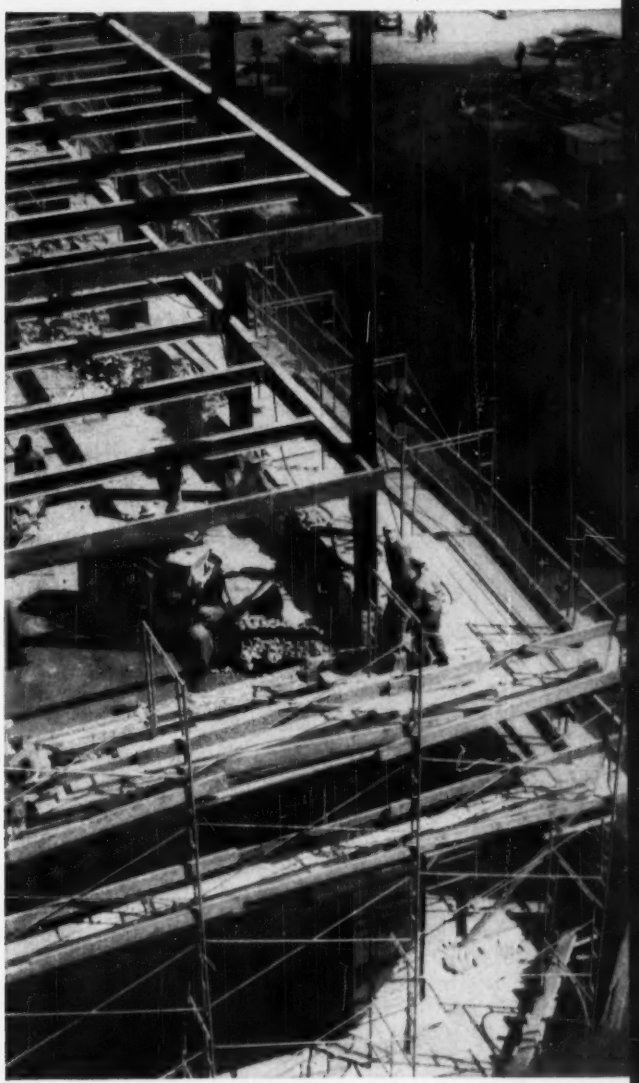
Upon completion of cleanup on each floor, the Tractor Shovels were lowered to the floor below by simple chain block and falls hung from the steel building frame. The crews then broke down the remaining wall and floor permitting it to fall to the floor below. And so it went, with the Michigans working downward, floor by floor, until ground level was reached. Huge excavator cranes removed the steelwork last.

And then, the Michigans went *underground*. The apartments had been erected on top of one of the main railroad tunnels which honeycomb subterranean New York City. The agile Michigans, working underground on top of the concrete tube, again saved many hours of hand labor.

Michigans paid for themselves

Supt Brown says, "The Michigans enabled us to more efficiently use our labor force. We needed only about one-half the man-hours normally required for demolition work on a job this size."

Perhaps you need a Tractor Shovel with the labor-saving abilities to work fast in restricted areas. There's the 16 cu ft Model 12B and seven larger sizes up to 6 cu yds. See your Michigan Distributor for the facts.



Bird's-eye view of small Michigan Tractor Shovel working on demolition of two 12-story apartments to make way for two 30-story office buildings on swank Park Avenue.

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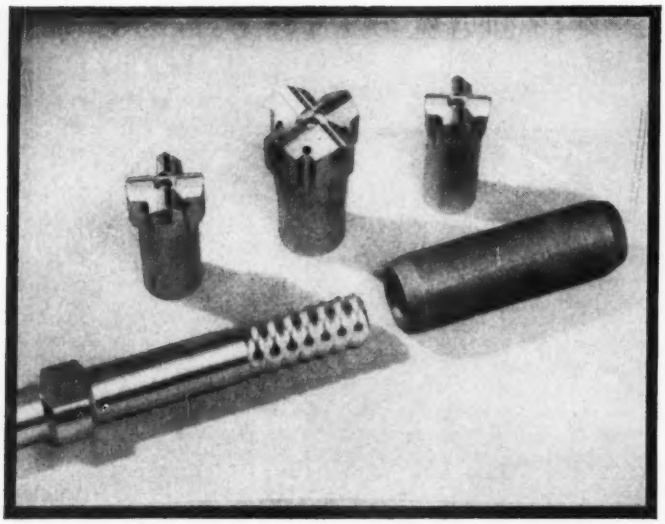


Here's proof Coromant rope-thread bits and steels SAVE TIME AND MONEY

"Up to double the footage between sharpenings!"
"Premature rod breakage is almost non-existent!"
"40% more usable life—more resharpenings!"
"Bit and rod life are well above average!"
"Uncouple by hand all the time!"
*"More rigid—drills straighter holes!"**

**Names of men quoted available on request*

The comments above are actual quotes from project managers, job superintendents, and drill superintendents who have tested new Coromant rope-thread bits and steels. They've learned, on-the-job, the benefits they—and you—can expect!

For example: The new rope-thread (only two turns per inch) holds tight in use, yet permits hand uncoupling. Reports show that the time saved results in more footage drilled per shift. Bit footage is well above average too, with less loss of carbide inserts. Prime quality ore plus nickel-chrome alloy permits cold-rolling from billets for greater strength, life and rigidity. And only with Coromant rope-thread steels can you re-thread without heat treating, too. Do it yourself, or at any nearby machine shop.

Want to know more? There's no obligation on your part, but we'll be glad to help where we can. Just call your nearest Atlas Copco Office, or write to us at Dept. CM-7.

Atlas Copco

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

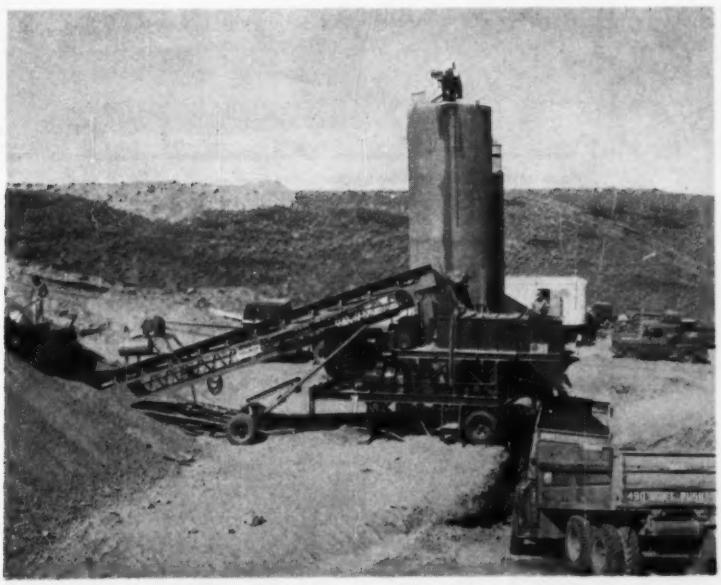
PLACING BASE MATERIAL—With a spreader in each lane, this contractor lays cement—treated base over the full width of the roadway in one pass. Average production is 3,400 lin ft in a 10-hr day. Rubber-tired roller makes first compaction pass.

Pair of Spreaders Lays Base

TWO AGGREGATE SPREADERS, working in echelon, averaged 3,400 lin ft a day of cement-treated base on a 9-mi stretch of bituminous-surfaced highway in Montana. A fleet of 25 GMC tandem trucks kept the pair of aggregate spreaders supplied with material.

Carlson-Lien Construction Co. of Rapid City, S. D., had a $565,000 contract for the last 9.4-mi section of a new highway that cuts 56 mi from the normal route between Rapid City and Billings, Mont. They finished work on the road last fall.

Carlson-Lien's price included $1.196 per sq yd for a 7-in. cement-treated base containing 6% cement by weight, $0.835 per sq yd for a 3-in. plant-mix bituminous surface, and $0.330 per sq yd for a seal coat.



AGGREGATE PLANT—Trucks load aggregate from 600-tph plant. Contractor never hit full production because of water shortage. He had to haul water 9 mi to the plant.

They obtained aggregate for both base and surface from a scoria pit located near the west end of the project about half a mile off the roadway. Scoria is burned clay or shale formed by the burning of coal beds. It is the only aggregate available in the region.

Aggregate for the base was crushed to a maximum size of 1½ in. It contained 45% plus No. 4 material as well as non-plastic fines. Maximum density of the final mix was 115 lb per cu ft with an optimum moisture content of 15%. Aggregate for the bituminous surface mix was crushed to a maximum size of 3/4 in. and some of the fines were rejected.

The plant was a Hetherington-Berner S-400 plant with one Hetherington-Berner 325-bbl cement silo and one Ross 250-bbl cement silo. A Kolman conveyor and hopper handled the aggregate. Power was supplied by a GMC diesel power plant.

The plant had a capacity of 600 tph but never reached that production because of water shortages. The contractor drilled a 50-gpm well on the site and set up a 20,000-gal storage tank. But to bring the 7% moisture content of the aggregate up to the specified 15%, the plant needed 150 gpm of water, and the well could not supply it. To make up the difference, four

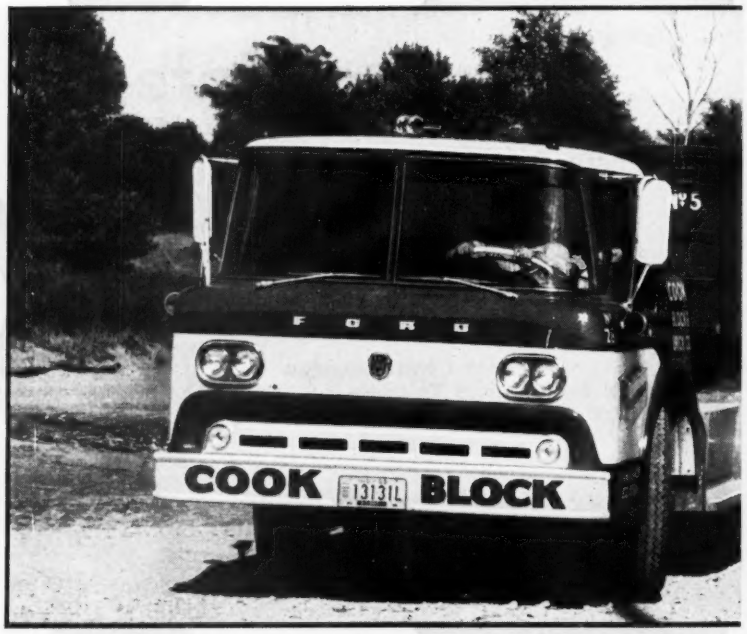
continued on page 104

Here's another reason why Ford Trucks are your best buy!

"OF ALL THE MAKES WE'VE TRIED FORD TRUCKS GIVE US THE LOWEST MAINTENANCE COST!"

ANOTHER REPEAT BUYER OF FORD TRUCKS

Virgil E. Cook, owner of Cook Block and Brick Co., is convincing proof that there is still plenty of opportunity in American business for those sound planning, hard working individuals who want to own their own business. Starting from scratch just 13 years ago, he now owns and operates one of the largest concrete products plants in Eastern Indiana. The workhorses in his fleet of 16 trucks are three Ford Tilt Cab Tandems that are used to haul sand and gravel to the plant and make deliveries in and around Anderson.



Hard-working Ford CT-950 tractor leaves Cook gravel pit with 18 yards of aggregate. Aluminum walking beam and rubber suspension system of tandem axle assembly reduce chassis weight, permit higher legal payloads.

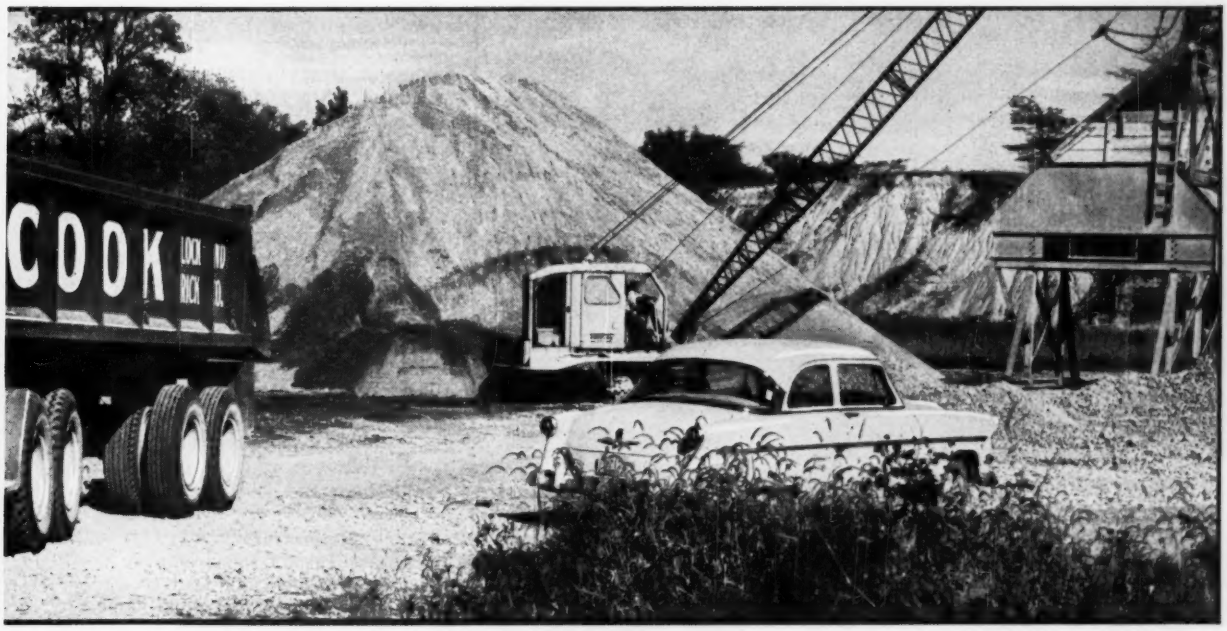
Cook's CT-850 with special flat-bed body and Side-O-Matic unloader delivers blocks right to the job site. Unit carries 600 concrete blocks and spots them where needed.

"Our experience has proved that Ford Trucks can be operated at substantially lower maintenance costs than any other make we've tried. And, equally important in a fleet like ours, we find that our Fords spend much less time in the shop. None of the Ford units purchased since 1958 have been in for major repairs and I am still amazed at the way the older ones keep going.

"The best truck we've ever owned is a 1954 Ford C-700 that consistently carries a load of 350 to 400 blocks over all types of terrain. In spite of this severe work it ran 125,000 miles before we replaced the engine. This unit now has over 140,000 miles on the original ring gear and pinion and it went 60,000 miles before we relined the brakes and put in a new clutch. This is outstanding mileage when you consider that we've realized as little as 12,000 miles from competitive ring gear and pinion sets. Clutch and brake life obtained with other makes in identical service was only 20,000 miles. It's results like this that keep our costs low and convinced us that we should stay with Fords when we bought our bigger trucks in '58.

"Our 1958 and 1959 Ford Tilt Cab Tandems give every indication of equalling or surpassing the fine records set by the C-700. The two CT-950 tractors hauling sand and aggregates to our processing plant breeze through traffic and take the hills like they weren't there at all. Our CT-850 equipped with a flat-bed body has the power and traction to deliver finished products anywhere. With Ford's tilt-cab design we get a real plus as far as payload is concerned because we can carry at least 2,000 pounds more weight on the front axle.

"We buy Ford Tilt Cab Trucks because we think they're the best engineered and most modern gasoline trucks in the heavy-duty field. Here at last is a truck built to permit big legal payloads with enough power to move these loads at economical speeds. We pride ourselves on our modern and efficient equipment and consider our Fords one of the most valuable assets of our business."



'60 Fords are built for longer life . . . with Certified Durability!

Whatever your job . . . wherever you do it . . . you'll discover just as Mr. Cook did, that Ford Trucks are the best investment for your transportation dollar.

Certified results of tests conducted by America's leading independent research organization (name available on request) confirm the fact that Ford Super Duties have been refined for still more durability! Automatic radiator shutters, improved electric fuel pumps and redesigned wiring harnesses are typical of the advancements to be found in these units.

Automatic radiator shutters reduced the coolant temperature variation recorded in severe mountain road tests from a 79° range to a 20° range. Engine operation with coolant temperatures in the 167° to 187° range means less expansion and contraction, more efficient combustion and better lubrication . . . all of which contribute to longer engine life.

Dynamometer tests showed *no vapor lock* with Ford's submerged-type electric fuel pump at temperatures up to 200°. Incipient vapor lock with mechanical fuel pump resulted in a power loss of 9% under the same conditions. Shaker table tests plus constant exposure to oil, water and heat proved 1960 wiring harness to be *three times longer lived.*

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . BUILT TO LAST LONGER, TOO!

VIBRATORY ROLLER — Bros Vibra-pactor roller makes several passes over base after rubber-tired roller has finished.

FINAL COMPACTION—Galion Roll-O-Matic tandem steel-wheel roller makes final passes before asphalt surface is laid.

RAKING···FOR PROFIT

Model RE YORK RAKE speeds up grading and lawn-building job in preparation for seeding.

How to cut grading and raking costs with YORK MECHANICAL RAKES

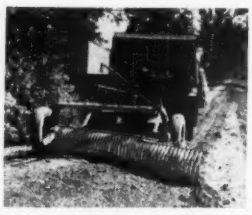
More and more contractors find YORK RAKES invaluable for speedy completion of jobs on highway, institutional, industrial, municipal and housing development contracts.

With a YORK RAKE *you can do rough grading; remove stones, roots, debris; spread topsoil; do leveling and finish raking; spread crushed stone, gravel.* Choose a model to fit your motive power.

YORK RAKE, MODEL RE fits all three-point hitch tractors. SCARIFIER (optional) breaks hard ground. Attaches permanently to Model RE, adjusts instantly to working or carrying postion. Other models available for lighter tractors.

YORK RAKE,MODELS RA and RB (trailer-type) available for use with regular motive power.

YORK RAKE, MODEL PG attaches to most heavy-duty motor graders. Folds out of way when not in use.



YORK RAKE, MODEL RB (trailer-type) may be used with any motive power. Photo above shows Model RB in use for road maintenance.

YORK RAKE, MODEL PG doubles the efficiency of power graders . . . by redistributing windrow left by blade. Removes oversize stones, leaves smooth surface. Can be angled to discharge material to either side.

It Costs You Nothing To Get The Facts!

For literature and name of your nearest distributor, write Dept. CM-10.

York

MODERN CORPORATION

UNADILLA, NEW YORK

semi-trailer 8,000-gal water trucks hauled water 9 mi from the Powder River.

The subgrade material was a sandy loam that was extremely unstable when dry. The contractor was able to run trucks over it by spraying it with water to keep it near optimum moisture content. They added scoria to the worst spots.

One Ulrich spreader and one Blaw-Knox spreader, pushed by two International TD-24 tractors placed the cement-aggregate mix. The two spreaders laid the full 29-ft width of the base to a loosely packed depth of 10 in.

Rolling the Base

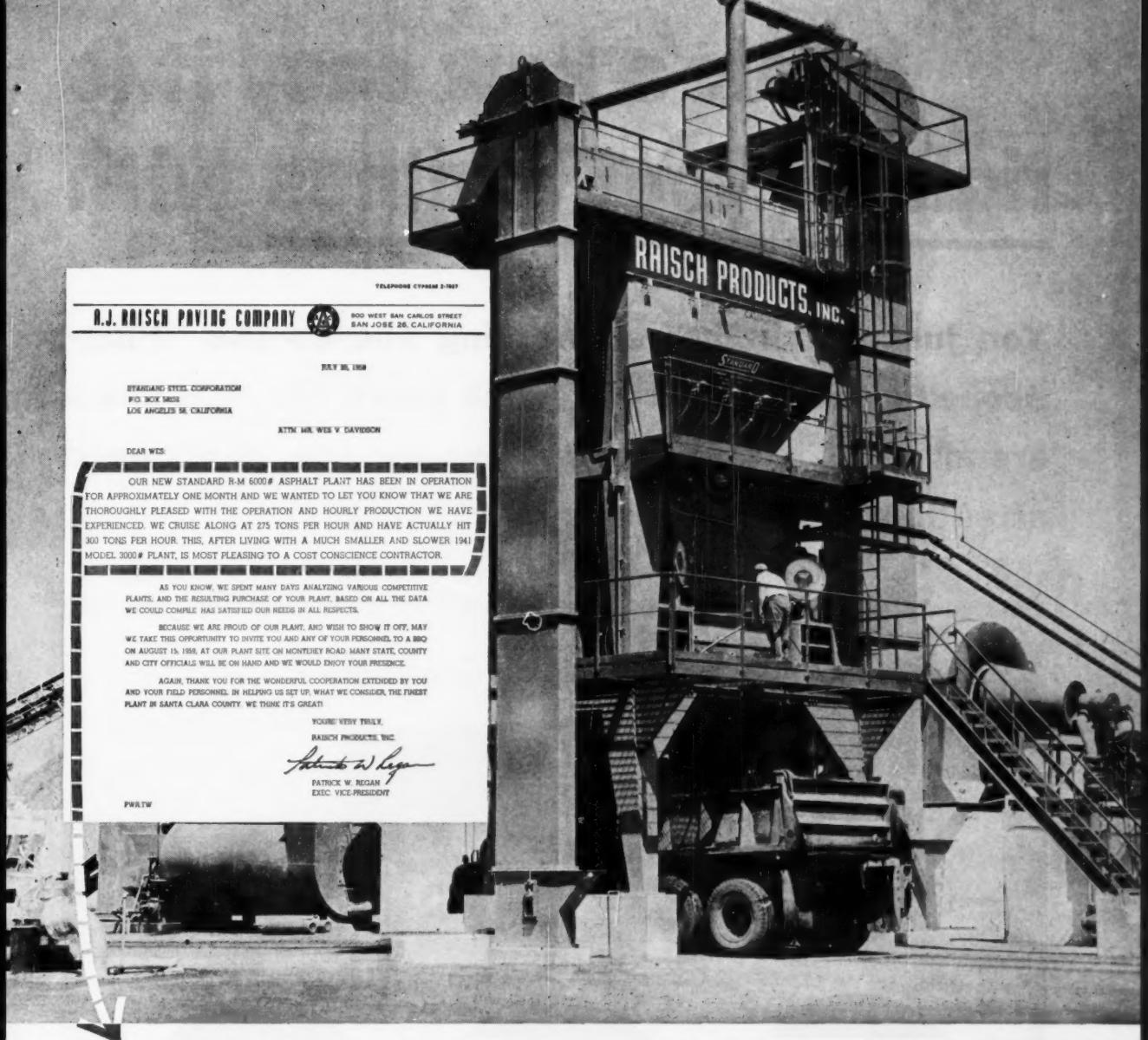
Compaction and shaping took several passes. First, a Bros self-propelled pneumatic roller made three passes over the base. Then a Galion No. 160 grader went over it to cut out the tire marks and shape the base.

Next, a tractor-drawn Bros Vibra-pactor roller made two or three passes. It was followed by a Cat No. 24 grader that shaped the road section and edge slope. A Galion Roll-O-Matic tandem steel-wheel roller handled the final rolling.

The completed base was protected by several light sprinklings of water until about 1,500 lin ft were finished. Then an asphalt curing compound was added. This procedure saved a great deal of water, particularly during the hot summer months.

The 3-in. asphalt surface was placed in two 1½-in. lifts. A seal coat of 3/8-in. maximum chips went on the surface.

For Carlson-Lien, Louis Brendonberg was superintendent, and Wally Schaff was plant foreman. Jess Freshour was project engineer for the Montana State Highway Department.



TELEPHONE CYPRESS 2-7927

R.J. RAISCH PAVING COMPANY

900 WEST SAN CARLOS STREET
SAN JOSE 26, CALIFORNIA

JULY 30, 1959

STANDARD STEEL CORPORATION
P.O. BOX 58218
LOS ANGELES 58, CALIFORNIA

ATTN: MR. WES V. DAVIDSON

DEAR WES:

OUR NEW STANDARD R-M 6000# ASPHALT PLANT HAS BEEN IN OPERATION FOR APPROXIMATELY ONE MONTH AND WE WANTED TO LET YOU KNOW THAT WE ARE THOROUGHLY PLEASED WITH THE OPERATION AND HOURLY PRODUCTION WE HAVE EXPERIENCED. WE CRUISE ALONG AT 275 TONS PER HOUR AND HAVE ACTUALLY HIT 300 TONS PER HOUR. THIS, AFTER LIVING WITH A MUCH SMALLER AND SLOWER 1941 MODEL 3000# PLANT, IS MOST PLEASING TO A COST CONSCIENCE CONTRACTOR.

AS YOU KNOW, WE SPENT MANY DAYS ANALYZING VARIOUS COMPETITIVE PLANTS, AND THE RESULTING PURCHASE OF YOUR PLANT, BASED ON ALL THE DATA WE COULD COMPILE HAS SATISFIED OUR NEEDS IN ALL RESPECTS.

BECAUSE WE ARE PROUD OF OUR PLANT, AND WISH TO SHOW IT OFF, MAY WE TAKE THIS OPPORTUNITY TO INVITE YOU AND ANY OF YOUR PERSONNEL TO A BBQ ON AUGUST 15, 1959, AT OUR PLANT SITE ON MONTEREY ROAD. MANY STATE, COUNTY AND CITY OFFICIALS WILL BE ON HAND AND WE WOULD ENJOY YOUR PRESENCE.

AGAIN, THANK YOU FOR THE WONDERFUL COOPERATION EXTENDED BY YOU AND YOUR FIELD PERSONNEL IN HELPING US SET UP, WHAT WE CONSIDER, THE FINEST PLANT IN SANTA CLARA COUNTY. WE THINK IT'S GREAT!

YOURS VERY TRULY,
RAISCH PRODUCTS, INC.

Patrick W. Regan

PATRICK W. REGAN
EXEC. VICE-PRESIDENT

PWRTW

"WE CRUISE ALONG OVER 275 TONS PER HOUR!"

"Our new Standard R-M 6000 pound Asphalt Plant has been in operation for approximately one month and we wanted to let you know that we are thoroughly pleased with the operation and hourly production we have experienced. We cruise along at 275 tons per hour and have actually hit 300 tons per hour."

STANDARD
ASPHALT PLANTS
THE WORLD'S FINEST

STANDARD STEEL CORPORATION

General Office & Plant: 5089 Boyle Avenue, Los Angeles 58, California
Eastern Division—Office & Plant: Lowell 89, Mass.
Midwest Division—Office & Plant: Decatur 89, Ill.

PARTS WAREHOUSES IN LOS ANGELES AND DECATUR, ILLINOIS

Attention Contractors! **The New STANDARD**

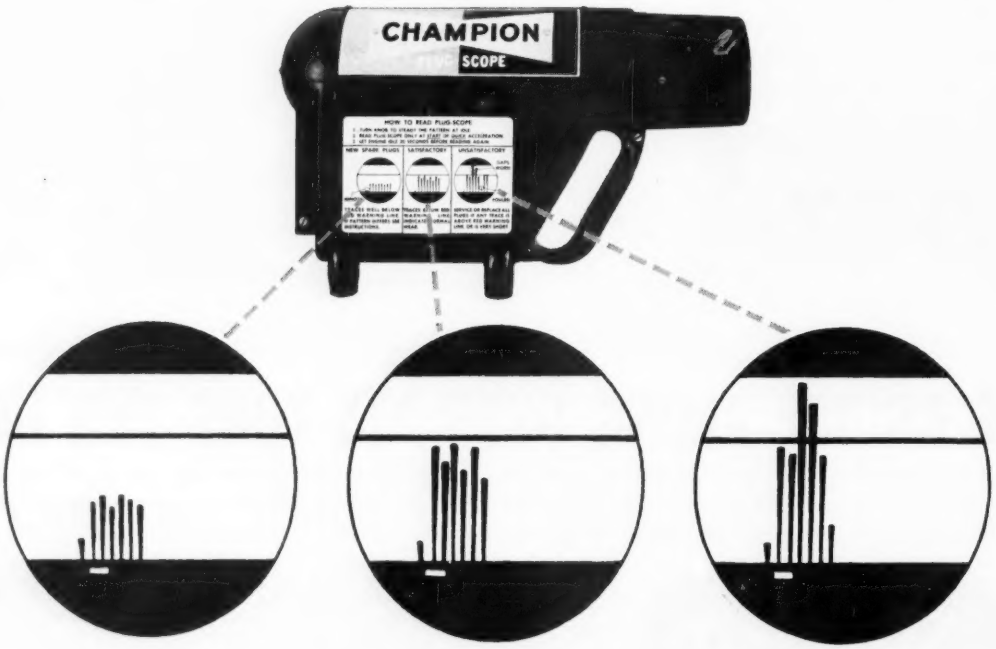
PORTABLE T. M. PLANT offers top production. A *complete* self-contained batch type Asphalt Plant...on wheels. One man operates! Has exclusive "SELF-LIFT" erecting device. RUGGED—ECONOMICAL—SIMPLE. Mixes up to 80 tons per hour!

ROTARY DRYERS • KILNS • COOLERS • ASPHALT PLANTS • CRYOGENICS

Here's how easy it is right in your engines with

You just watch the red warning line on the "Plug-Scope" screen. If traces remain below the line, plugs are all right. If traces rise above the line, plugs need attention. It's as simple as that!

Here's how easy it is to read the Champion "Plug-Scope"



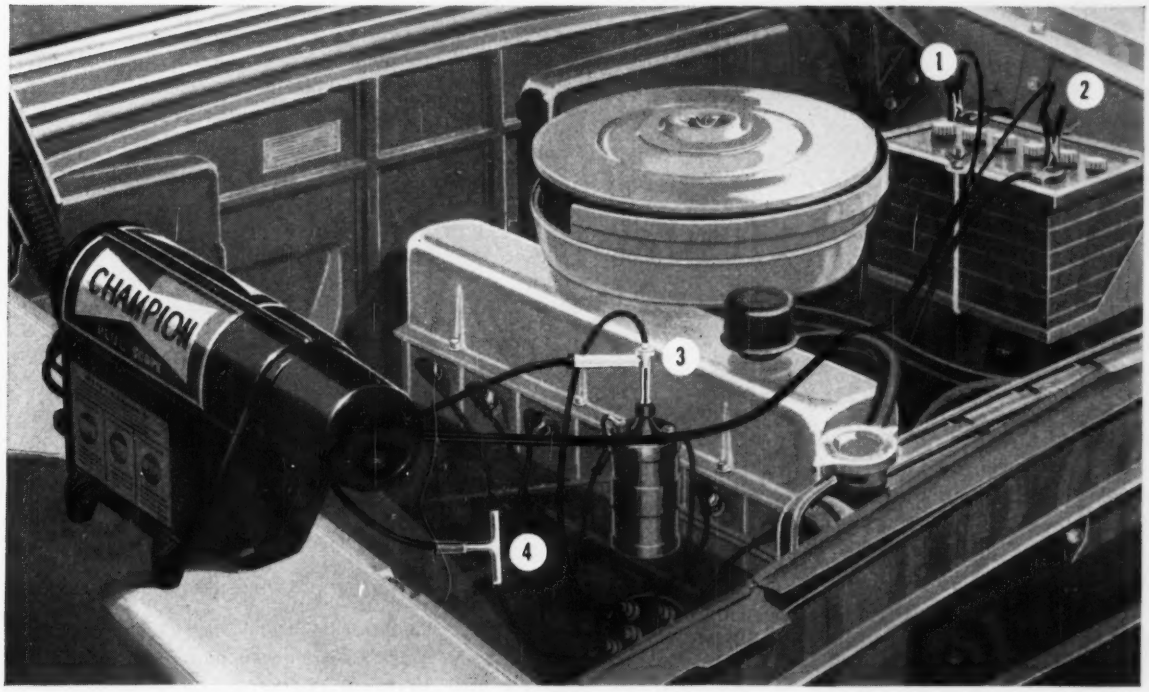
NEW SPARK PLUGS
traces well below red warning line

SATISFACTORY SPARK PLUGS
traces still below red warning line

UNSATISFACTORY SPARK PLUGS
traces rise above red warning line

to check spark plugs a Champion "Plug-Scope"

Here's how easy it is to hook up the Champion "Plug-Scope"



Simple instructions are right on the "Plug-Scope." Connect two leads to battery, insert third connector into distributor tower or coil, clip fourth connector around any spark plug cable. Start the engine. Accelerate suddenly and release immediately – reading "Plug-Scope" at moment of acceleration.

That's all there is to it – and it takes less than 60 seconds to hook up and read the "Plug-Scope"!

The Champion "Plug-Scope" is a portable, transistorized oscilloscope that electronically checks spark plugs right in your engines. The "Plug-Scope" can also be used during preventive maintenance operations to check available ignition voltage and to help you track down common ignition problems such as reversed coil polarity and hidden breaks in spark plug cables.

Powered by the vehicle's battery, the "Plug-Scope" can be used anywhere in your shop, as well as out on emergency road calls. And – best of all – the Champion "Plug-Scope" is so easy to hook up and read that anyone in your shop can use it!

A Champion "Plug-Scope" will save time, reduce maintenance costs and improve engine performance for your fleet. Ask your Champion supplier for a "Plug-Scope" demonstration right away!

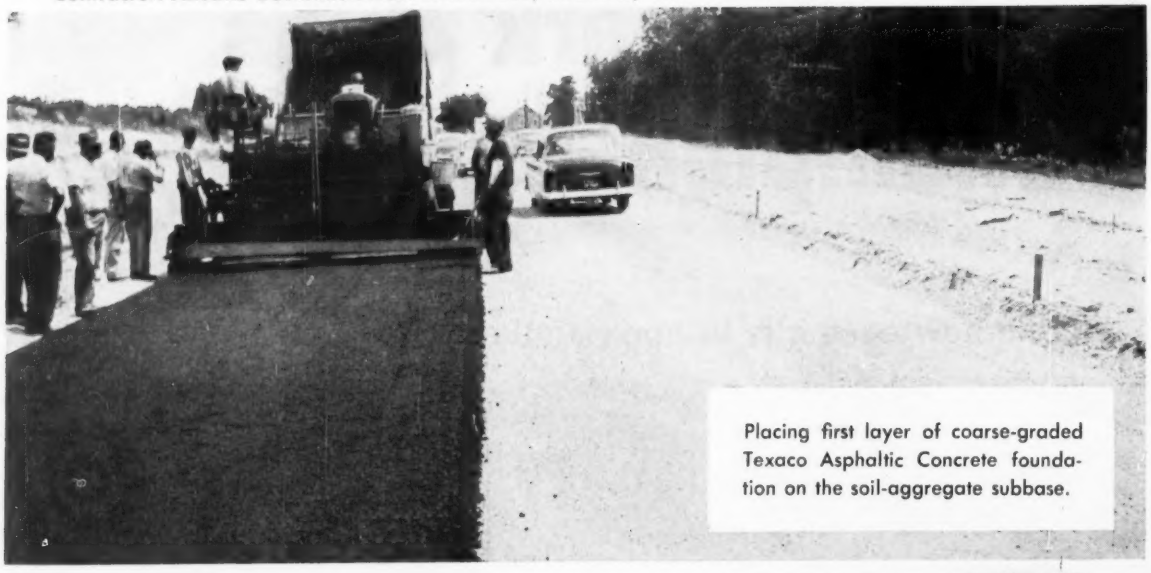
DEPENDABLE

CHAMPION

SPARK PLUGS

CHAMPION SPARK PLUG COMPANY • TOLEDO 1, OHIO

Contractor: **ADAMS CONSTRUCTION COMPANY, Roanoke, Va.**



Placing first layer of coarse-graded Texaco Asphaltic Concrete foundation on the soil-aggregate subbase.

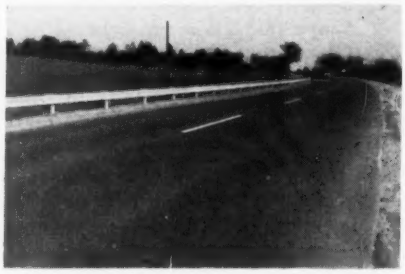
This Virginia highway needed a heavy-duty pavement

A 4½-mile section of U. S. Route 460 in Prince Edward County is an example of heavy-duty Texaco Asphalt paving as Virgina constructs it. Both the foundation and the wearing surface are of rugged plant-mix Asphalt construction. Coarse-graded Texaco Asphaltic Concrete was used for the 5½-inch foundation and fine-graded Texaco Asphaltic Concrete for the 1½-inch wearing surface. Under this asphalt pavement is a 5-inch soil-aggregate subbase.

Its performance on Virginia's primary highways recommends this heavy-duty type of Texaco asphalt construction for the Interstate Highway System. Not only does it absorb punishing impact year after year, with a minimum of upkeep, but its first cost is substantially lower than that of rigid paving of comparable design. Let Asphalt help give your State extra miles of modern roads for its highway dollars.

Helpful information on heavy-duty Asphalt paving, as well as the various intermediate and low-cost types of Asphalt construction, is supplied in two free Texaco brochures. Ask our nearest office to send you copies. There is no obligation.

Constructing fine-aggregate Texaco Asphaltic Concrete wearing surface.



Durable, resilient, glare-free Texaco Asphaltic Concrete on 4½-mile section of U. S. Route 460 in Prince Edward County, Va.

TEXACO INC., Asphalt Sales Div., 135 E. 42nd Street, New York 17
Boston 16 • Chicago 4 • Denver 1 • Houston 1 • Jacksonville 1
Minneapolis 3 • Philadelphia 2 • Richmond 25

TEXACO ASPHALT

CATERPILLAR REPORTS:

THE BIG STORY BEHIND THE BIGGEST EARTHMOVING JOB IN MICHIGAN...

Holloway Construction Company depends 6,000,000 cu. yd. in 16 months on

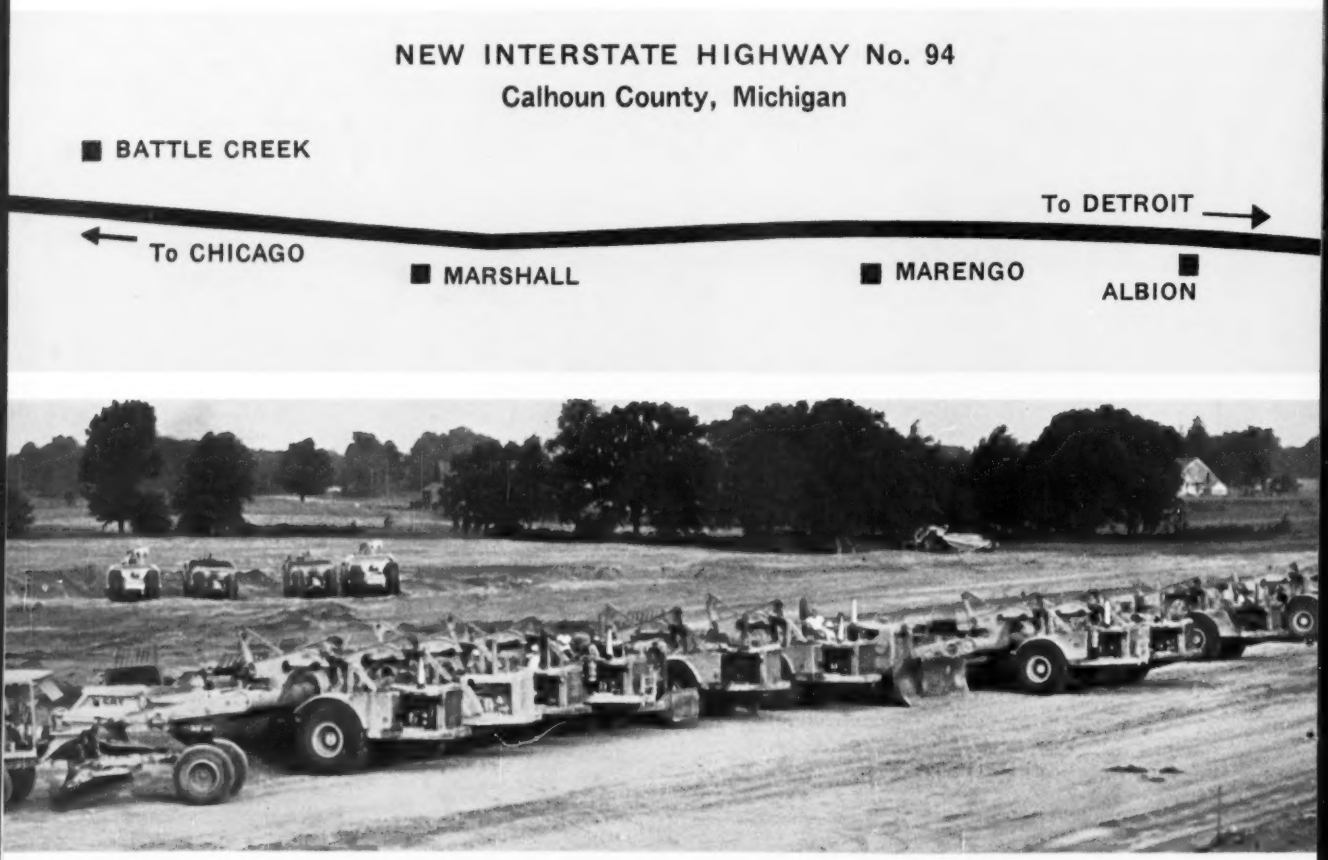
Michigan contractor's giant highway spread is 95% Caterpillar!

From Albion to Battle Creek, 6,000,000 cu. yd. of sand, clay and muck are being moved to speed traffic over the rugged hills of south central Michigan. In the largest earthmoving job ever handled by a single contractor in the state, curving U. S. 12 is being converted into 21 miles of Interstate 94.

Midway between these two cities you can stand with your feet planted deep in the soft, brown clay and look in either direction, as far as the eye can see, at the army of yellow Caterpillar machines carving out the path of this new roadway.

The Holloway Construction Co. of Livonia, Michigan, won the $8,500,000 contract by being low bidder on three continuous segments of the project. Work started on April 1, 1959, and is due for completion by August 3, 1960. As of the latest report, according to Bud Morrell, Job Supt., production was running 10 months ahead of schedule.

To keep pace with the demanding schedule, men and equipment are working a steady 11 hours every day. And the Holloway spread—twice as large as any other assembled by one contractor in the state—depends heavily on Caterpillar quality to maintain this high-production capacity.



Part of the Holloway Construction Company's massive equipment spread that is now working on Michigan's biggest earthmoving job. 95% of the machines are Caterpillar-built, assuring the dependability needed to keep the job on schedule. When work is completed, Interstate No. 94 will be one of the key routes between Detroit and Chicago.

on Caterpillar machines in moving 21-mile Interstate Highway project

There are 66 Caterpillar-built machines operating on the job including:

40 DW21 Tractor-Scrapers

8 D9 Tractors	**2 D4 Tractors**
8 D8 Tractors	**4 No. 12 Motor Graders**
2 D6 Tractors	**2 No. 14 Motor Graders**

For successful contractors throughout the country like Dan Holloway, there is only one reason for using Caterpillar equipment: "I think Caterpillar is the best equipment made in terms of high production and low cost of operation."

This, indeed, is the big story behind Michigan's biggest earthmoving job.

Gamma Rays speed soil compaction tests. This new device, developed by the Michigan Highway Department, determines compaction as well as moisture content. In two minutes it can perform work which takes a half hour by conventional methods.

High-speed loading of DW21s with Cat D8 and D9 pushers is clearly visible in a borrow pit several miles north of Marshall, Michigan, one of the towns to be bypassed by the new highway.

WHAT THE MEN WHO KNOW MACHINES HAVE TO SAY ABOUT CATERPILLAR-BUILT EQUIPMENT:

Francis "Bud" Morrell, Job Supt., Holloway Construction Co. "You can count on Caterpillar. When you take a big job, you must be sure that your equipment is going to stay on that job. We take care of our machines, work them like hell, and know that these Caterpillar machines take good care of us."

George Neely, Equipment Supt., Holloway Construction Co. "We like Caterpillar machines because they are better than any other make. We've tried them all at one time or another, but these other manufacturers have a long way to go before we change our minds on which equipment is the best."

Dan Holloway, Owner, Holloway Construction Co. "Caterpillar machines make more money for us. They stand up under 12-month-per-year punishment. Last December we moved one million yards of dirt in 28 days. We had to keep after it day after day to prevent it from freezing."

Russ Hill, Master Mechanic, Holloway Construction Co. "When a machine goes down, you have to move fast to get it back on the job. We want the right part fast. Michigan Tractor (Caterpillar Dealer) takes good care of us. When a part is guaranteed, you know they'll back it up."

NEW PRODUCTS FROM CATERPILLAR SET NEW PRODUCTION STANDARDS

Here's a review of 3 important product developments born of Caterpillar research . . . proved in the field . . . available to you now for higher production

New 225 HP Cat No. 619 Tractor and 14 cu. yd. No. 442 Scraper

First two-wheel tractor to deliver four-wheel speed and dependability . . . matched with new No. 442 Series B LOWBOWL Scraper for new high production. The new No. 619 with Turbocharged Cat Engine provides 225 HP and high torque rise, ideal for lugging under load and fast acceleration. Its LOWBOWL Scraper handles 14 cu. yd. struck, 18 cu. yd. heaped. It has a 30.2 MPH operating speed, plus ground-hugging roadability never before found in a two-wheel tractor of comparable size. It is a versatile "all job" rig.

SynchroTouch Transmission Control for DW20 and DW21 Tractors

An advanced new way to shift gears easier and faster. Operator simply dials desired gear for automatic, split-second, touch-and-go response! In less than a second, it is engaged. Standard foot clutch is retained but is used only starting from standstill.

Optional for DW20 and DW21 Tractors, the Caterpillar SynchroTouch Transmission Control gives you these important benefits: 1. Faster shifting—for faster cycles and more payloads per hour. 2. Significant reduction in operator fatigue. 3. Economical direct drive transmission—uses standard DW20 and DW21 transmission and clutch components. 4. No special maintenance.

Power Shift Transmission for D8 and D9 Tractors

On-the-go shifts under full load in a split second. Changes speed, reverses direction with finger-tip control lever—and no clutching! This new transmission, with exclusive new design, provides production highs never before possible with a track-type tractor.

Power shift control is mounted to operator's left. Selector lever (black knob) eliminates gearshift, forward-reverse and flywheel clutch levers. Safety lever (red knob) prevents accidental engagement. Selector lever moves in a "U" path to various positions.

See your Caterpillar Dealer for the complete facts. Ask him to demonstrate these new product developments on your job.

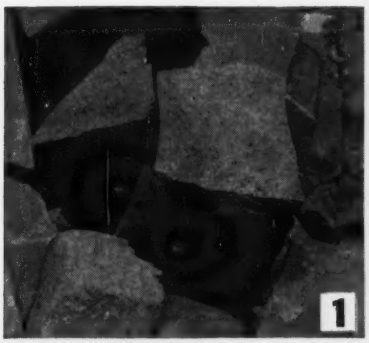
Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

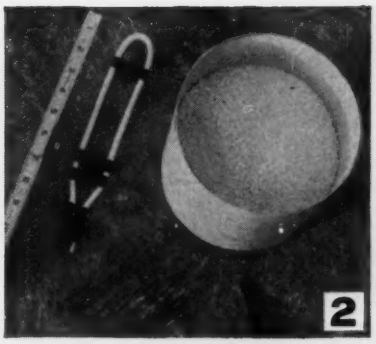
CATERPILLAR

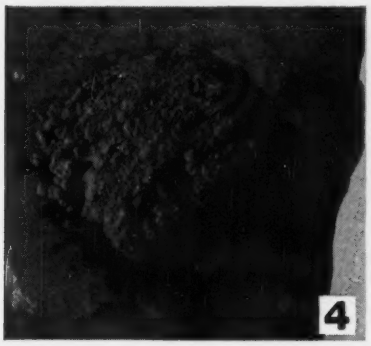
Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

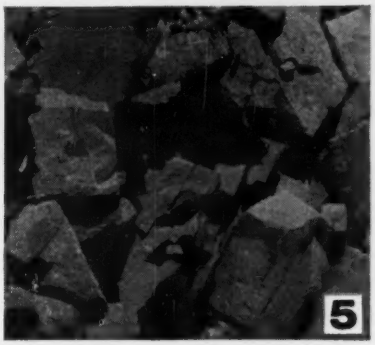
DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

GREAT NEW PRODUCTS IN THE CATERPILLAR TRADITION









1. Basalt boulder prior to blasting.
2. Spencer N-IV and 6% diesel #2 fuel oil plus 20" of 175-grain detonating cord.
3. N-IV-fuel oil mixture being placed on boulder.
4. View of completed "mudcap."
5. Boulder after blast.

"Mudcapping" Now Possible With Ammonium Nitrate-Fuel Oil Mixtures:

Another example of Spencer Chemical Company's continued research in the blasting field

The pictures above show another example of how Spencer research is finding new and better ways for using Spencer N-IV Ammonium Nitrate-fuel oil mixtures in blasting operations. Using the same basic materials and preparation used in blasting bore holes, it is now possible to do "mudcapping" for breaking up large boulders.

The Spencer N-IV Ammonium Nitrate used for each blast is put in an ice cream container and mixed with 6% diesel #2 fuel oil. The material is set on the boulder and dirt is packed around it. The charge is initiated with a loop made from 20 inches of 175-grain detonating cord.

Whether you use Spencer Ammonium Nitrate N-IV and fuel oil mixtures for "mudcapping" or for blasting bore holes, you'll find that Spencer N-IV as an ingredient in blasting agents produces more energy than competitive grades of ammonium nitrate. That's because Spencer N-IV has a special structure that lets the prills absorb oil more easily, and N-IV contains a higher percentage of ammonium nitrate.

Yet, Spencer N-IV Ammonium Nitrate costs you no more than other brands!

Spencer Chemical Company also has available a machine scientifically designed for placement of N-IV-fuel oil mixtures into horizontal blast holes. Called the Spencer Powder Monkey, this unique device eliminates tamping bags, tamping equipment, or the labor needed to fill and tamp bags into the hole.

For complete information, mail the coupon below:

SPENCER®

Spencer Chemical Company
409 Dwight Building
Kansas City 5, Missouri

I want to know more about:

☐ Spencer N-IV Ammonium Nitrate as a blasting ingredient.
☐ Spencer Powder Monkey.

Name_____

Firm_____

Address_____

City_____ State_____

Contractor: West Delaware Tunnel Constructors; *Drill Steel Reconditioner:* New York Steel and Rock Bit Co.

Drill Steel Bores Blast Holes for New York's New Water Tunnel.

This photograph shows Bethlehem Hollow Drill Steel boring blast holes in Catskill Mountain sandstone, near the No. 6 Shaft of West Delaware Tunnel, at Livingston Manor, N. Y. Upon completion, the 11 ft, 4 in.-diameter tunnel, 44 miles long, will be an important new link in New York City's vast water supply system. West Delaware Tunnel Constructors, contractors for this phase of the project, used 1¼-in. round Bethlehem Hollow, fitted with carbide-insert bits. They reported good drilling progress, with minimum breakage. Bethlehem Hollow, in Carbon and Ultra-Alloy grades, is well known for its economy. That's why you'll find it in service in every kind of rock removal project.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

1960 WHAT'S AHEAD

A SPECIAL REPORT — Here's a forecast of business prospects for this year and an analysis of the problems the construction industry will face in 1960.

a big year

Almost the Best In History

This year will be the second biggest construction year in history—just a shade under 1956, the record year.

Contract awards will rise 6% above the 1959 level. *Construction Methods* forecasts total 1960 awards of $21.6 billion. The 1956 all-time record was $21.7 billion.

As recently as last September it looked like 1960 would show only a modest improvement over 1959. But since then several additional sources of strength have developed.

One of the most important is the turnaround in the outlook for highway and bridge construction. The federal government will provide enough highway aid to push roadbuilding to a record level in the first six months of this year.

Another is the prospect that private construction will be up 7% this year. There'll be a big increase in industrial building, and commercial building will reach a new record level. In addition, awards for pipelines, transmission and distribution lines, and other utilities will rise.

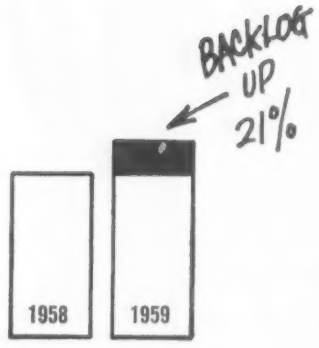
The sizable gains in prospect for these types of work will more than offset a drop in mass housing, the one weak spot in the private construction outlook. But the drop in mass housing will not be severe.

Finally, federal work will also provide contractors with more business this year than last. Military construction, including a number of missile facilities, will rise sharply during the first half of the year. And the prospects are good for an increase in Corps of Engineer civil works construction.

The backlog of planned work is building up . . . on the next page

1960 WHAT'S AHEAD *more jobs to bid on*

Planned Work Hits Record Peak

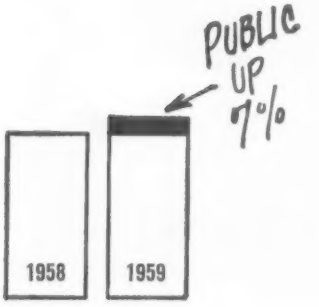


BACKLOG

A record amount of proposed construction is now on the drawing boards. Projects in the planning stage have a total estimated cost of more than $116 billion as measured by the *Construction Methods* Backlog of Heavy Construction.

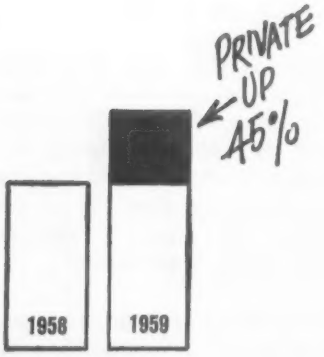
This backlog of potential future contracts built up at a fast clip during the last three months of 1959 despite the fact that financing costs moved up to the highest level in three decades. But the backlog also rose steadily throughout 1959 to a 12-month's total of more than $20 billion. This was a decisive reversal of the 1957-58 downtrend in construction planning. And the fact that such a low volume of construction moved through the planning stage was mainly responsible for the failure of contract awards to rise faster in 1958 and 1959.

Now that work is again piling up on the drawing boards, contractors can look forward to a chance to bid on more jobs. How fast contract awards increase this year depends on the availability of capital to finance new construction. The pressure of rising demand for construction is "tightening" the supply of capital, but the construction industry's customers will get enough money this year to finance a near-record volume of construction contracts.



PUBLIC WORKS

The estimated construction cost of new public works proposed during the first 11 months of 1959 is 7% higher than the total for the entire 1958 year. Federal jobs entering the planning stage showed a 12% gain. State and municipal projects were 5% higher, a very significant gain because it reverses a decline that started in 1956 and was particularly steep in 1958. State and local public works projects often take at least two years to pass through the planning stage to contract so contractors probably won't feel the full impact of this rise in the Backlog until next year.



PRIVATE PROJECTS

The estimated cost of private projects proposed during the first 11 months of last year jumped 45% above the total for 1958. And many of these projects will go to contract during this year. Industrial plants, for example, usually pass through the planning stage in six to nine months. Commercial buildings take a little longer—12 to 15 months is usual for most projects.

FORECAST OF 1960 CONTRACT AWARDS

(Compiled by CONSTRUCTION METHODS)
(in millions of dollars)

	1959 Estimate 53 Weeks	1960 Forecast	Percent Change 1959-60	Backlog as of Nov., 1959
ALL HEAVY CONSTRUCTION	**$20,281**	**$21,580**	**+ 6**	**$116,685**
By Ownership				
Private	10,366	11,035	+ 6	50,624
Public	9,915	10,545	+ 6	66,031
State and Municipal	7,140	7,670	+ 7	51,530
Federal	2,775	2,875	+ 4	14,501
By Type of Work				
PUBLIC				
Waterworks	375	450	+20	2,810
Sewerage	650	725	+12	3,784
Bridges (incl. private)	595	760	+28	3,416
Highways	2,890	3,320	+15	12,841
Earthworks, dams, waterways	915	950	+ 4	12,110
Buildings (excl. housing)	2,580	2,400	− 7	21,169
Mass housing	565	465	−18	
Unclassified	1,360	1,485	+ 9	9,900
PRIVATE				
Mass housing	4,700	3,900	−17	23,066
Commercial buildings	2,165	2,500	+15	
Industrial buildings	2,990	4,000	+34	17,022
Unclassified	500	625	+25	10.477

INDUSTRIAL BUILDING will be the fastest-growing source of new business in 1960 with a 34% jump forecast, on top of a 70% increase last year. This will reflect 1959's rapid buildup of proposed plants in the planning stage and the fact that industrial construction plans are traditionally less affected by "tight" money and high borrowing costs.

The long steel strike apparently discouraged some companies from appointing engineers and architects to plan new facilities, but the end of the steel shutdown triggered a sharp increase in the number of projects entering the planning stage during November and December.

COMMERCIAL BUILDING set a new high in 1959, and this year's awards should climb 15% to a new record. Plans piled up at a strong, steady pace during 1959; there's enough work in the planning stage now to support a much greater increase this year than *Construction Methods* forecasts. But there won't be enough money to meet the needs of all those who would like to award contracts for office buildings, stores, and shopping centers this year.

HOUSING is the weak spot in the construction market. Money's the problem; financing difficulties will cause a decline of about 17% in mass housing. This won't be nearly as severe a decline as the 43% drop in 1957 when a much tighter money market put housing in a strait jacket.

HIGHWAY AND BRIDGE construction should have a record first half in contract awards this year, and the second half of the year will be far better than last year when the federal government all but shut off the flow of funds from the Highway Trust Fund. At least 60% of the state highway departments will award more federal-aid highway and bridge awards this year than last.

DAM IRRIGATION AND WATERWAY construction contracts should rise in 1960 because there will be a substantial number of new starts. California's huge water resource development program—to cost upwards of $2 billion—started last year and more jobs will come up for bids this year.

AIRPORT construction set a record last year for county and municipal projects. Yet airport building is not rising fast enough to meet the needs of expanding air traffic. Federal aid hasn't been increased for this year so there's not likely to be any increase in awards.

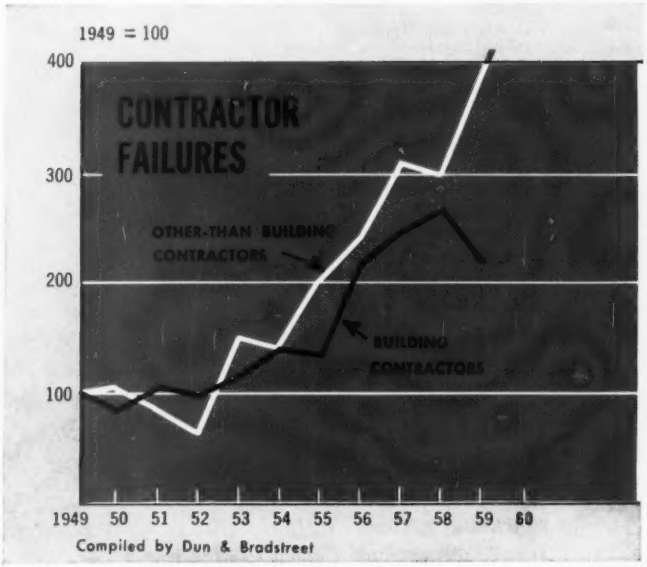
MISSILE BASE construction grew into a major heavy construction market last year when awards topped $850 million. This was nearly triple the 1958 total. Missile work should increase 15% or more this year.

Competition won't be quite so stiff in 1960 . . . on the next page

1960 WHAT'S AHEAD

competition - not quite so stiff

More Business Will Ease The Squeeze On Profits



Competition in 1960 will continue to take its toll even though heavy construction business climbs to near-record levels.

There will be more contracting firms handling heavy construction jobs this year, and many of these firms will be bigger—capable of taking on a greater volume of work.

This has been the consistent pattern in the industry for a number of years. But it does not apply with equal force in all parts of the country or to all types of construction.

The total number of building contractors, for example, has remained fairly constant since 1956; the number of contractors on other-than-building construction jobs has jumped 20% during the same period.

This has had an impact on the rate of failures in the two groups. General building contractor failures last year, according to figures compiled by Dun & Bradstreet, were 17% below their 1958 peak. But failures in the other-than-building group were 36% higher than in 1958. Even when the failure rate of this group is adjusted to compensate for the increased number of contractors in the field, the trend is upward, though much less sharply.

The pressure on contractors from the rising cost of labor, materials, and equipment will ease a bit this year—assuming that there is no increase in steel prices.

Construction costs, estimated by *Construction Methods*, should rise only 2.7% in 1960. That compares with a 4.5% rise in 1959 and annual increases ranging from 4.6% to 5.1% in the years from 1954 to 1958.

The building cost rise should be only 1.1% in 1960 compared with 3.4% in 1959 and 3.2% to 5.2% annually from 1954 to 1958.

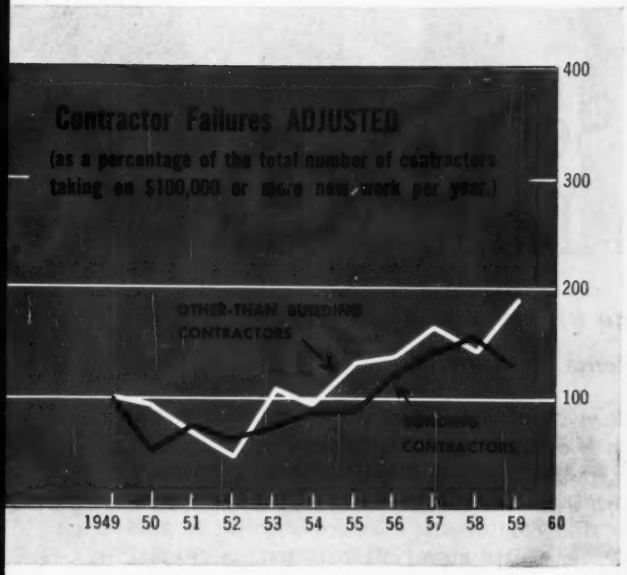
ROADBUILDING

Competition last year was particularly severe for highway jobs. The volume of work available during the first half of the year was up about 1% from the 1958 level. But available work dropped off sharply during the second half of the year because of the shortage of federal aid funds, and competition increased proportionately.

During the first half of 1959 (the latest period for which complete data is available) there was an average of 7.4 bidders for each highway contract. That compares with an average of 5.8 bidders for each contract let in 1956.

Low bids on the 1959 contracts averaged 11.3% under the engineer's estimates; in 1956 low bids were only 3.7% under the estimates.

On the 1,713 contracts let during the first half


Contractor Failures ADJUSTED
(as a percentage of the total number of contractors taking on $100,000 or more new work per year.)
400
300
200
100
OTHER-THAN BUILDING CONTRACTORS
BUILDING CONTRACTORS
1949 50 51 52 53 54 55 56 57 58 59 60

of last year contractors left on the table almost $148 million. Total cost was $1.3 billion. In 1956, on 2,875 contracts they left on the table only $56 million. Total cost was $1.5 billion.

In some states, of course, competition was far more severe than the average for the U.S. as a whole. In Delaware there were 11.5 bidders for each highway job, and the low bids averaged 12% below estimates. That compares with an average of 5.4 bidders and low bids 8.1% below estimates in 1958.

In Tennessee there were 11.3 bidders per job last year compared with 7.6 in 1958, and the bids last year averaged 14.2% under estimates.

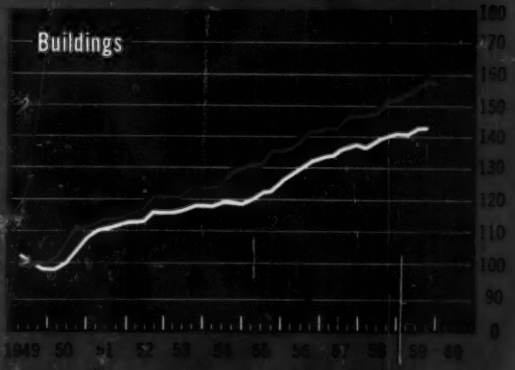
Oklahoma averaged 11.2 bidders compared with 8.3 in 1958, and their bids were 18.7% below estimates. Mississippi had 11.1 bidders averaging 14.7% below estimates.

On the other hand, there were only 4 bidders per contract in Rhode Island compared with 5.7 in 1958. In Iowa the average number of bidders dropped to 4.3 from 5.8 the previous year.

The increased volume of highway jobs programmed for the first half of this year should ease the pressure of competition, but roadbuilding will remain highly competitive.

Another big boost in wage rates is a sure bet . . . on the next page

THE BID PRICE-COST GAP



Building contractors' bid prices continue to rise but at a slower rate than their costs for skilled labor and materials. Competition for business will ease in 1960 with the rise in building volume.

Irrigation and hydro-electric construction costs are running below their 1958 peak, but competition for this type of work is sharp. Volume will be up in 1960, but not to the 1958 peak.

Highway bid prices show the smallest rise compared to the trend in the cost of labor and materials. Mechanization and high productivity account in part for this. But the squeeze on contractors' profits in the increasingly competitive bidding holds bid prices down, too.

1960 WHAT'S AHEAD *another hike in wages*

Unions Won't Settle For Less Than Last Year

Wage rates for construction workers go up every year. The rise this year will be at least 15 cents an hour.

Wages in the construction industry will go up again this year. This pattern of regular annual wage increases for construction workers seems to be well established.

An increase of at least 14 cents an hour for 1960 is probable. That's the average amount that many unions will receive automatically under existing long-term contracts. The figure for construction is twice as high as the average deferred increase for workers in all other industries.

This automatic increase is likely to be the lowest amount that unions negotiating new contracts in 1960 will settle for. It's anybody's guess how much more they will get.

Last year the average increase for the construction industry was 15 cents an hour, one of the highest annual increases on record. It's not likely that labor will settle for less this year.

Some of the biggest boosts will be on the West Coast. About 85,000 California carpenters are due to get 22 cents an hour more under previously negotiated contracts. An additional 35,000 laborers in California will get an extra 16 cents an hour. On the other hand, laborers in Massachusetts will get deferred increases of only 10 cents an hour, and another 8,000 in Pennsylvania will get only 12 cents.

Negotiations in the steel industry will affect coming negotiations in the construction industry. If the steel companies can hold the line on substantial increases, construction will have an easier time of it.

But it won't be much easier, no matter what steel does. In spite of a growing desire to hold wages steady throughout industry, there is little evidence of any real braking in the upward push of construction labor costs.

Spiralling wages will put increasing pressure on contractors to increase productivity. Up to now, the only really effective way to do this has been with more efficient machinery and better materials. These will continue to be the major tools to keep costs down.

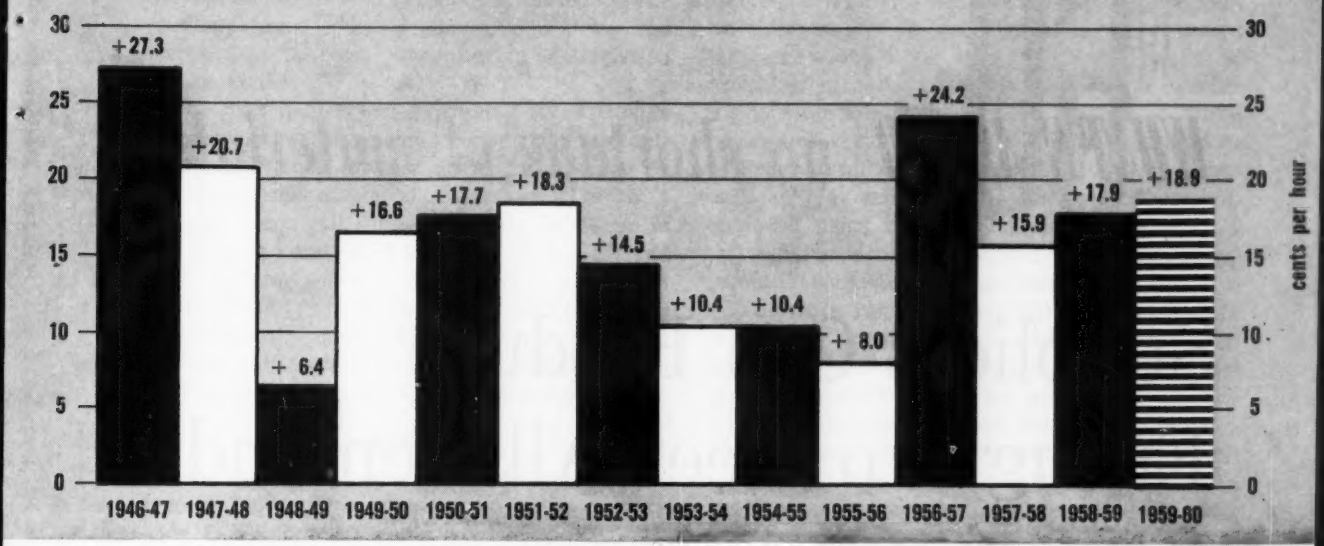
This is indicated by the trend toward more work with fewer workers in the construction industry. Between 1956 and 1958, new construction put in place increased 4% while construction employment fell 11%. The trend continued in 1959. In the first eight months, new construction in place increased 13% over the corresponding period in 1958, while employment increased only 4%.

The other major way to cut costs is to increase the productivity of labor. But this is harder to do, and so far results have not been encouraging. The much publicised program announced by Richard Gray, head of the building trades, to eliminate makework practices, slowdowns, and featherbedding has produced only minimum results.

But the attitude of the AFL-CIO Building and Construction Trades Department is promising. They seem to be genuinely interested in implementing the policy: "There shall be no limit on production of workmen or restriction on the full use of proper tools or equipment and there shall not be any task or piece work. . . . Slowdowns, forcing of overtime, spread work tactics, standby crews, and featherbedding practices have been and are condemned."

Average Annual Increase in Three Skilled Trades

(CARPENTERS, BRICKLAYERS, IRON WORKERS — 20-CITY AVERAGE)



LABOR SUPPLY

No one seems to think that there will be any shortage in the total construction labor supply. But there may be shortages in specific trades.

Apprentice training is the key to this problem, and in this area there are some disturbing trends. At present, the number of new apprentices in construction is dropping. The situation is especially serious with carpenters, painters, glaziers, cement masons, plumbers, pipefitters, and plasterers. Other trades, in particular the electricians and sheet metal workers, have shown initiative in developing training programs.

In the next few years there will be an upsurge of younger workers entering the labor force. At the same time there will be a decline in the number of mature workers who have provided training on an informal basis. This means that more and better training programs must be set up or the industry will suffer in the number and quality of its skilled workmen.

The Landrum-Griffin Bill, passed last year, recognized this need; it includes a provision specifically legalizing employer contributions to training funds. As a result, the Labor Department expects that scores of additional labor-management cooperative training programs will be set up this year.

Officials have just completed a major study of the trend and effectiveness of training programs and the outlook for the next decade. Title is "Major Requirements and Training Needs in Construction Occupations 1960-70." (copies are available free from the Department of Labor, Washington 25, D. C.)

The report indicates a number of new training programs are already under way. Right now, there are about 3,500 joint training programs in existence in the construction industry. But the Labor Department feels that a much greater effort will be needed to maintain an adequate supply of skilled workers.

LABOR LAW

Contractors can get set for a building trades drive next spring to lift what amounts to a legal ban imposed by the U. S. Supreme Court on construction strikes at sites where more than one contractor is working.

The unions want to knock out the ban on secondary boycotts against on-site picketing of a particular contractor if the picketing affects other contractors. Labor thought it had such legislation assured in Congress last year. But it was shelved to assure passage of the Landrum-Griffin Bill.

Other effects of the Landrum-Griffin Act will not be felt until government agencies sort out the complex business of how to administer it. First step has already been taken. The Department of Labor has officially set up a Bureau of Labor-Management Reports to be headed by a Commissioner. The bureau will issue interpretations of the provisions of the act, authorize and institute investigations, issue orders to compel attendance and testimony of witnesses, and make decisions on matters coming before it.

Supplies of all basic materials will be adequate . . . on the next page

1960 WHAT'S AHEAD *no shortage of materials*

Suppliers Can Produce Enough to Meet All Demands

STEEL

There'll be enough steel to meet all construction demands this year, but it won't be easy to get it on normal schedule until about April.

During the next four months, fabricators who handle about 75% of the steel that ultimately reaches contractors will have to work hard to get back to normal after the 116-day steel strike.

Delays in their shipments of fabricated steel will be common. On small orders that take six to eight weeks to fabricate, delays probably will be about two weeks. On larger, more complex orders — those that ordinarily require four to six months to fabricate—delays are likely to be about a month.

But by April fabricators expect to be able to deliver construction steel on a normal basis.

Shipments from fabricators totaled 2,490,000 tons during the first 10 months of 1959. That's 20% less than their shipments during the same period of 1958. And at the end of the long steel strike, their backlog of orders amounted to 1,890,000 tons. They expect to ship about half of that tonnage before the end of February.

New orders now are coming in fast. Fabricators expect heavy bookings during 1960 as industry pushes expansion plans deferred last year because of the steel strike.

The American Institute of Steel Construction says shipments from fabricators this year will total about 3,400,000 tons. That's admittedly a conservative estimate. If construction booms to near the record pace of 1956, shipments may come close to 4,000,000 tons.

The fabricating industry has the capacity to handle this volume of business. They shipped a record 4,200,000 tons in 1957, and since then have expanded their facilities substantially.

Steelmakers will provide all the steel that construction needs in 1960. They're set to produce more than 125,000,000 tons of raw steel to meet the pent-up demand of customers.

The mills wasted no time in refilling the pipeline after the long layoff. They bounced back into production spectacularly, reaching 90% of capacity within 15 days of the back-to work court order.

Record high production in the first half of 1959 lifted total output for the 10 months ending in October to 74,200,000 tons, slightly higher than

the figure for the corresponding period of the previous year. This enabled fabricators and warehouses to build stockpiles in anticipation of the strike.

The steel industry is continuing its expansion program aimed at raising productivity and cutting costs. Steel makers spent an average $1 billion in each of the six years prior to 1959. Current plans call for a whooping 76% rise in spending to nearly $1.7 billion in 1960. Deferred 1959 spending accounts for part of the increase.

The capacity of rolling mills to turn out structurals for the construction industry has been boosted substantially—from 6,800,000 tons in 1957 to more than 8,000,000 tons today.

CEMENT

Contractors will use more cement than ever before in 1960, and in most parts of the country they'll pay about 10 cents a barrel more for it than last year.

Shipments of cement this year will set a new record, continuing the post-war upward trend that has been interrupted only by the recession in 1957. In spite of cutbacks in the highway program that have reduced requirements for concrete paving to about 75,000,000 barrels from much higher original estimates, shipments in 1960 will total about 335,000,000 barrels. That's a healthy jump over the estimated 318,000,000 barrels shipped last year.

New uses for concrete, such as precast structural members and thin shells, will contribute substantially to the rise in demand for cement. And prestressed concrete will continue to improve its competitive position in the highway bridge field.

Cement producers will have the facilities to turn out all the cement that contractors need in 1960. Capacity of the industry will reach about 420,000,000 barrels by the end of the year.

Expansion of productive facilities has boosted capacity of the cement industry by more than 100,000,000 barrels since 1955, when cement was in tight supply despite operation by producers at nearly 100% of capacity. But demand is catching up with capacity fast, and a similar tight situation could develop in two or three years unless manufacturers continue expansion.

Price of bulk cement will be 10 to 15 cents a barrel higher in 1960. Most large producers announced price increases before the January 1 price-fixing deadline. Bagged cement went up about 20 cents at the same time.

The price rise this year follows a settlement with labor on an average wage increase of 10 cents an hour. Several factors helped keep the price rise moderate. Many producers are concerned that capacity of the industry is considerably higher than current demand. And competition from foreign cement has prodded some producers, particularly along the Atlantic Coast, into holding the price line.

OTHER MATERIALS

Asphalt for road surfacing will cost more this year, too. But it's not because of any shortage of supply. All the major oil refineries produce asphalt as a by-product; they could turn out 10 times as much as the construction industry is using now by adjusting the refinery process.

And lumber prices are rebounding from the price slide that began towards the end of last year when housing starts declined. Price cuts ranged from $1 to $7 per Mfbm on Douglas fir and southern pine 2x4's in most areas.

But now prices are on the upswing as demand strengthens with the pick-up in construction. Price increases of $3.50 per Mfbm have been reported recently in New York, and more are on the way. Lumbermen expect prices to recover a good part of the ground lost in the slump at the end of 1959.

Better methods will improve efficiency . . . on the next page

TWO OF THE NEWEST CEMENT PLANTS

Typical of the expansion of the cement industry are these Ideal Cement Co. plants at Ada, Okla., and Tijeros, N.M., both completed last year.

1960 WHAT'S AHEAD *better methods*

New Ways to Improve

All construction will benefit from improved methods in 1960. Advances in roadbuilding techniques will be outstanding.

The roadbuilding industry is heading toward a major breakthrough in methods and equipment. And most other fields of construction can expect new ideas in 1960, too.

The roadbuilding developments will come more from a modernization of outdated specifications than from any revolutionary new concepts. Federal agencies are pushing for standard specifications throughout the country to speed construction of the highway system.

State highway departments have developed their own specifications. Many now are lagging behind the latest engineering knowledge of earth and pavement. Also, contractors find it difficult to work in more than one state because they have to change methods and equipment from one state to the next.

Manufacturers have been reluctant to develop new machinery because of the difficulty of getting it accepted in enough states to provide a reasonable market. One manufacturer estimates that, because of the varying state specifications, the industry has to produce three times as many models of roadbuilding machines as are needed.

New testing methods and measuring instruments will speed acceptance of new specifications. A radically new non-destructive soil test, using radioactive elements, is highly effective.

As these improved measuring systems come into common use, highway departments will be more receptive to current contractor pressure for the "end result" type of specifications that would leave the contractor free to choose the proper equipment to achieve the specified result.

PAVING

Larger concrete pavers are a sure bet for 1960. Koehring's Tribatch paver is already on the market. Other manufacturers will follow with their own versions.

Several even more revolutionary methods will become common as soon as states are willing to accept them. A few states already are allowing slip form paving.

The slip form concept represents almost complete automation in paving. The most advanced machine in production today, a Rex machine, can almost do the whole job itself. The concrete goes in the front end and the road comes out the back end. (For a report on another slip form paver, see page 82).

Central mix operations will represent another significant advance. Current bottleneck is the disagreement on mixing time. Evidence indicates that if a mixer is properly designed, a 10-yd mixer can do a satisfactory job in about the same time as a 1-yd mixer. When this concept becomes generally accepted by state highway departments, many contractors will swing to central mixing.

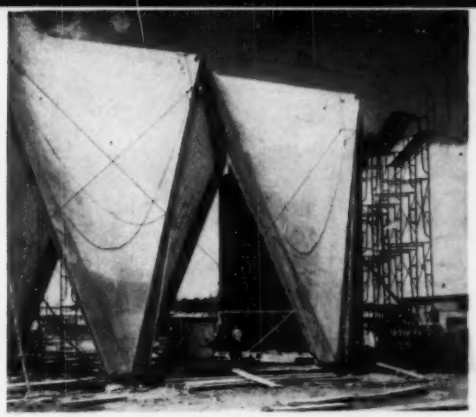
Prestressed pavement could be the biggest advance of all. But it probably won't come this year. The problem is not design—most tests indicate that existing techniques produce highly effective pavement. But the cost is not yet competitive with the initial cost of conventional pavement.

Prestressed pavement is stronger, longer lasting, and easier to maintain than conventional pavement. Therefore, say its supporters, it is cheaper in the long run, even though initial costs are higher.

So far, no roadbuilding agency has accepted it for regular use. But that situation could change quickly as the experience from current tests accumulates.

Prestressed paving is on the way, but initial costs are still high.

Complex shapes in concrete buildings will stimulate new forming ideas.



Efficiency

COMPACTION

The widest variation in machinery and specifications is in the compaction field. The practice of specifying certain types of machines results in almost every state requiring its own type of equipment.

Pneumatic rollers will become more widely accepted in the future. For asphalt pavement they seem to do a better job of compaction than steel rollers. Eventually, the proper combination of both will be developed—pneumatic rollers for heavy compaction and steel rollers for final smoothing and shaping.

The biggest problem in the compaction field right now is measurement and testing. So the first big advance will be in new methods of testing. Improved machines and better specifications will follow.

BRIDGES

More highway bridges than ever will be built with prestressed concrete in 1960.

In Europe, engineers have been experimenting with prestressed suspension spans. They have built one 330 ft long in Belgium. Now, designers are talking about spans up to 2,000 ft long.

Aluminum has not yet been widely used as a bridge structural material, but acceptance of aluminum designs may not be far away.

Designs for short span bridges depend on efficient shaping of rolled sheet material. Development is currently under way, particularly by aircraft companies, to find more efficient ways of mass producing aluminum sheet at lower costs.

One development in steel bridge construction will be acceptance of shop bolting. High strength steel bolts have become common for field erection and have produced economies in this area. Now, shop fabricators are picking up the idea. Soon they will be producing trusses and fabricated girders in the shop at lower cost.

BUILDINGS

Increased prefabrication will be the big trend in building construction.

In concrete work especially, builders of large buildings will prefabricate major pieces in an efficient central factory and reduce field operations to a simple assembly job.

One large builder already is far advanced in this technique. He builds walls and other components at low cost on a factory assembly line. When they leave the plant, they contain windows (with glass already in) utility lines, and hardware. Field assembly is a low-cost, high-speed operation.

Concrete shapes are getting more complex as designers explore new architectural concepts. This, in turn, is putting pressure on both designers and builders to develop more efficient forming techniques to keep costs down.

Lightweight concrete will find increasing use in building construction. Designers are talking about a 90-story building that can be produced cheaply by a combination of lightweight concrete and folded plate design.

The steel industry is keeping pace. Biggest advance will be in prefabricated floor beams with increased strength but less weight. Steel designers are getting into complex-shaped structures. Several have designed dome structures that are light, easy to erect, and provide a clear area inside.

OTHER DEVELOPMENTS

There'll be important progress in these fields, too.

- Tunneling. New tunneling machines and more mechanization will continue to replace hand methods.
- Pile Driving. Vibration methods of driving, both mechanical and sonic, are being developed.
- Blasting. Use of cheaper explosives, like ammonium nitrate, will continue to grow. Trend is toward larger size drill holes.

Machines will cost more but produce more, too . . . on the next page

1960 WHAT'S AHEAD *more powerful, more productive equipment*

Improvements Boost Production

Contractors will pay more for equipment in 1960, but they will get more for their money. New machines will be faster, more rugged, and easier to operate.

Last year, prices of all types of equipment increased an average of 3.5%. This year, the Department of Commerce predicts a 2% price hike. Tandem rollers and air tools will go up most; crawler crane prices may drop substantially.

Rental rates will be slightly higher, too. A survey of 1,500 machines by the Associated Equipment Distributors shows slight rate increases for most, but a few popular units may rent for less.

PORTABLE EQUIPMENT

Many machines are designed to travel over the highway and must conform to legal highway limits for size and weight.

Partially disassembling a machine or breaking it down into sections for highway travel is becoming more common. Some truck cranes on the market contain as much as 5 tons of removable parts to reduce the weight and make a special highway permit unnecessary.

Portable batch plants and mixing plants are being improved to make them self-erecting. Some of these units are equipped with their own jacks and hoists. One batch plant, built by Concrete Equipment Co. of Blair, Neb., is simply tilted up into operating position from two trailers.

A concrete finisher, built by the Flexible Road Joint Machine Co. of Warren, Ohio, not only breaks down into two trailers for transportation, but an additional design feature permits one of the parts to work as an independent unit. It gives the contractor a versatile rig that can work as a high production machine or as a specialized unit handling one particular finishing job.

Manufacturers are working hard to raise capacities and production rates of mobile equipment while keeping it compact. Some truck cranes handle booms as long as 250 ft and lift as much as 80 tons.

A combination distributor-spreader for surfacing work simultaneously applies an emulsion and stone. It moves as fast as 2½ mph. Basically, the unit is a tank truck with a front-mounted hopper and spray nozzles. For highway travel, the hopper is detached and becomes a trailer towed by the tank truck.

ENGINES

Even off-highway machines, with no limits on size or weight, cannot grow indefinitely because engines aren't big enough to power these rigs adequately.

The most powerful turbocharged diesel engine available today develops 600 hp. Horsepower can be increased by mounting two engines on a machine, but this complicates the drive train and adds to the cost.

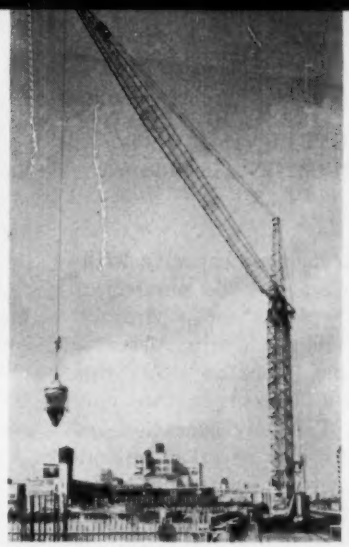
But manufacturers are aware of this, and bigger engines are on the way. The Cummins Engine Co. currently is field-testing such a power plant, and another manufacturer has an experimental engine developing more than 700 hp. Exotic power units are still off in the future, but manufacturers are experimenting with gas turbines, free-piston engines, a rotating combustion engine, and a fuel cell power unit.

The rotating combustion engine was announced by Curtiss-Wright and is said to be slated for production sometime in 1960. It has only two moving parts, and Curtiss-Wright claims it will have a good power-to-weight ratio and high efficiency.

Allis-Chalmers is experimenting with a fuel cell power unit that develops electrical energy through a chemical reaction.

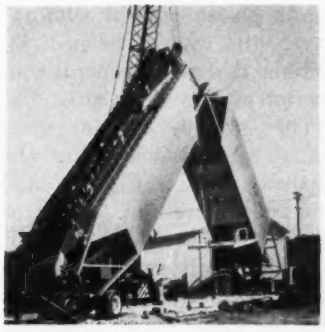
Refinements on engine turbochargers also will increase power and efficiency. Hercules Motors

Koehring Tribatch—turns out 172 cu yd an hour.



Universal Towercrane — one of several introduced in U.S.

# of Machines



Con-E-Co batch plant — tilt-up design simplifies erection.

R. G. LeTourneau roller—electric motors drive it.

Corp. has introduced engines that run on any petroleum fuel from high grade gasoline to lube oil. No adjustments are necessary when switching fuels. General Motors has introduced V-6 engines for truck applications.

Accessories, engine and drive train components, and steering mechanisms are in for modifications that will simplify their operation and maintenance. The fenders on Dodge trucks swing out for easy access to the engine compartment. Power shift transmissions, torque converters, and traction differentials will become standard on most mobile equipment.

Power steering will be improved, but centerline steering systems will become more popular, too, though they do not replace power steering entirely. Front axles built on this principle carry all forces in a vertical action through the centerline of the wheel and the tire.

The Paul M. Gillmor Co. of Findlay, Ohio, field-tested these axles on truck fleets, and Napco Industries of Minneapolis is adapting them to wheel tractors. The Rockwell-Standard Corp. has developed a similar axle. Because this axle reduces steering resistance, power steering units can be smaller or can be eliminated completely. Anderson Bolling Mfg. Co. has developed a similar steering system for dual front wheels.

OFF-HIGHWAY EQUIPMENT

Extremely large machines are too expensive for most contractors, but they can pay for themselves on big jobs.

R. G. LeTourneau's big tandem scraper with electrically powered wheels is one of the first of these giants. It was quite successful in moving large quantities of dirt for the Dulles International Airport at Chantilly, Va.

The diesel-electric drive principle also has been incorporated in a self-propelled tamping roller and a tree crusher, a special machine for clearing scrub forest land.

A similar motorized electric wheel has been developed by the General Electric Co. It was field-tested by several equipment manufacturers and will power a 55-ton dump truck under construction by the Unit Rig & Equipment Co. of Tulsa, Okla.

The Ferguson sheepsfoot roller is a four-drum, 40-ton rig that is powered by conventional engines, but there are four of them—one for each roll. This machine was built by the Shovel Supply Co. of Dallas, Tex. The company also has introduced a two-drum roller powered by two engines; this unit looks like half of one of the big rigs.

LeTourneau-Westinghouse and several contractors are adapting scrapers for tandem opera-

tion to increase capacity without increasing the number of power plants or operators. When bigger engines become available, more of these rigs will be used on big earthmoving jobs. Tandem operation of scrapers also permits the contractor to vary scraper capacity to fit the job needs.

PAVING

More and more machines will be controlled by electronic devices. Some machines will be almost wholly automatic.

An Italian electronics manufacturer has perfected a grade control device for bituminous pavers. It eliminates vertical irregularities in the finished road surface.

This device consists of an optical instrument about 300 to 500 ft ahead of the finisher and a sight mounted on the finisher. The collimation axis of the instrument is set parallel to the longitudinal gradient of the profile and aimed at the sight.

Colored lights on the sight indicate the finisher's position with respect to the correct grade. As soon as the finisher goes off grade, the telescope operator brings it back on the beam by operating an electronic push-button remote control.

A different device controls the vertical and horizontal alignment of concrete pavements placed with a slipform paver. It was developed by Gordon H. Ball, a general contractor of Danville, Calif.

This system depends upon piano wire strung along the roadway to exact grade and line and five sets of feelers, or probes, on the paver. A pair of sensitive limit switches is attached to each probe. They control the operation of hydraulic rams that set the level of the machine and steer it along the wire.

A good example of a big increase in capacity with only a moderate increase in size is the Koehring Tribatch concrete paver. Its outstanding feature is a shorter cycle time that results in greater output.

An Oregon contractor has developed machines for inserting reinforcing mesh and dowels after the full thickness of concrete has been laid in a single pass. These units have boosted paving speeds 14%.

Tower cranes are a relatively new item on the American construction scene, and there will be more of them. One distributor predicts that as many as 70 or 80 of these cranes will be imported during 1960.

Domestic manufacturers are watching the rapid rise in popularity of these cranes. At least one U.S. equipment builder plans to have a tower crane on the market this year.

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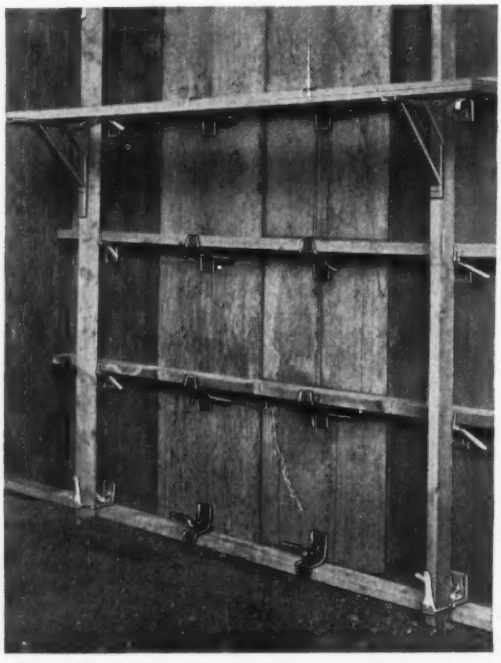

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Branches in Spokane, Rochester, Calgary

CME/1/60

THE 1-YARD WORKHORSE OF THE LORAIN LINE HAS BEEN RE-SHOD

A new bigger crawler under the Lorain-50 gives still better footing, a more stable base whether used as an excavator or crane. Always a tough digging machine as shovel or hoe, the new "50" can even better its fast high production performance.

25-ton capacity as crane. The increased crawler size gives increased crane capacities too. 14′ long by 11′ wide, it provides real stability, and Lorain's square-tubular-chord boom is lighter, stronger, gives longer reaches.

More work done with "Joy-Stick" controls. Regardless of the front end used, 2-lever, "Joy-Stick" air controls make it easier for the operator to get increased production. Each lever controls single or combined operations. "Metered air" valves retain normal feel of the machine. There is no easier way to get the job done.

You will want to get the full story on this improved machine. Why not see your nearby Lorain distributor today.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

One hoe digs four size trenches. Buckets are easily interchanged on the Lorain-50 hoe so that it can dig trenches 36", 40", 44" or 48" wide. 19-ft. or 23-ft. boom available.

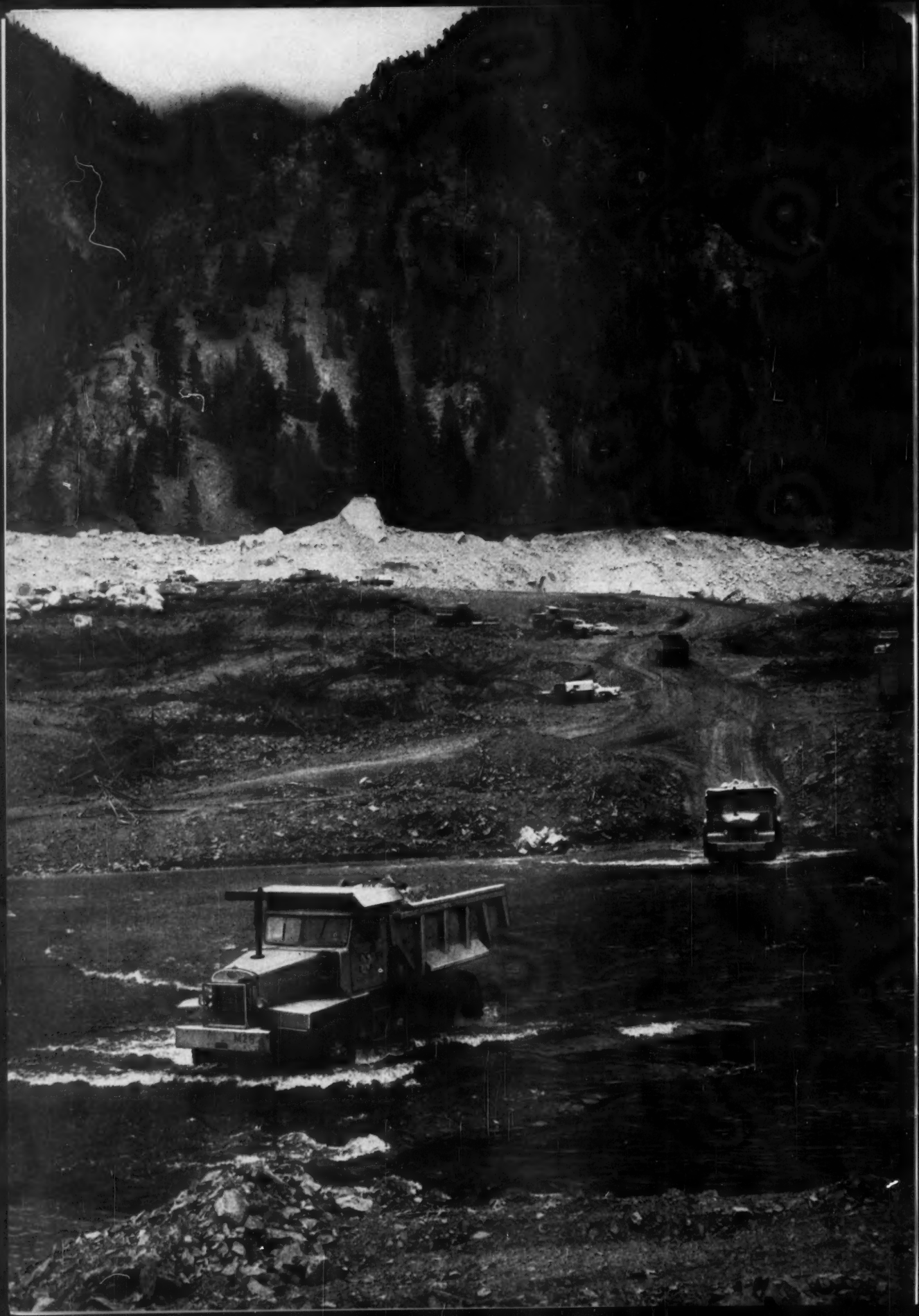
LORAIN®

ON THE MOVE

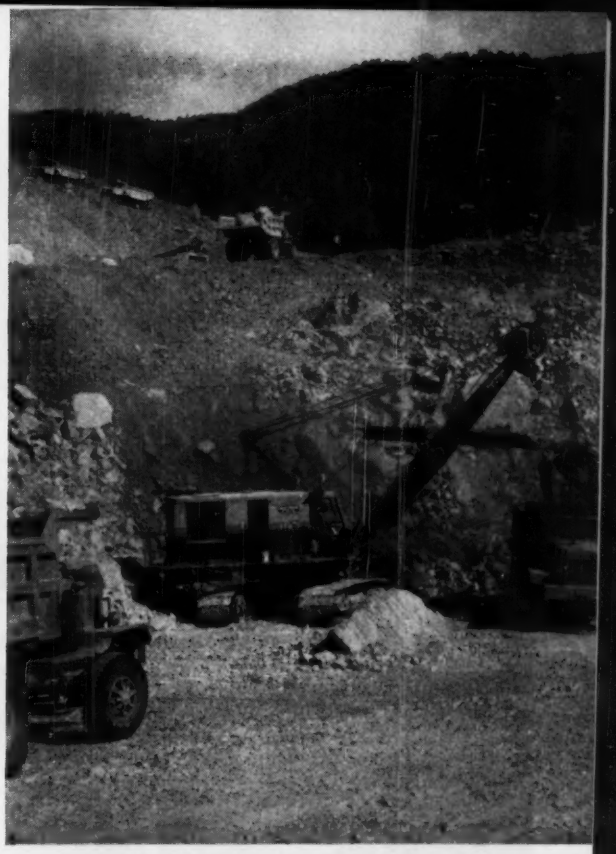
PLANTS in Lorain, Elyria and Bucyrus, Ohio.

PRODUCTS—Power shovels, cranes, draglines, clamshells, and hoes on crawler mountings from ⅜- to 2½-yard capacity • Cranes from 7 to 80 tons . . . on crawlers, and as rubber-tire Moto-Cranes, and Self-Propelled Cranes • Rubber tire front-end Moto-Loaders in 1¾- and 2-yard models.

OUTLETS—Lorain products sold and serviced by 249 distributor outlets throughout the world.



Thousands upon thousands of tons of rock were dumped along the base of the earthquake-made dam to form a "stilling basin." Here a Mack LVX dumper adds its load of rock to the river bed.



Crossing and recrossing parts of the trapped Madison River with loads of rock fill—all in a day's work for F & S Contracting Co. and the twenty-odd Mack dumpers assigned to the job.

From the base of one of the huge rock slides these Macks worked back and forth to the river bed on a round-the-clock schedule. F & S Contracting Company of Butte, Montana, owns and operates the big trucks.

Tremendous trucking job is aftermath of

The day the mountain fell

When a devastating earthquake shook a Montana mountainside into the Madison River, it created an earth-moving problem of staggering proportions. The river, trapped behind the huge rockslide, had to be quickly released to prevent disastrous floods. Heavy equipment from surrounding areas was mobilized. In a matter of hours emergency roads had been cut through to the remote quake site, and a crash clearance program was under way.

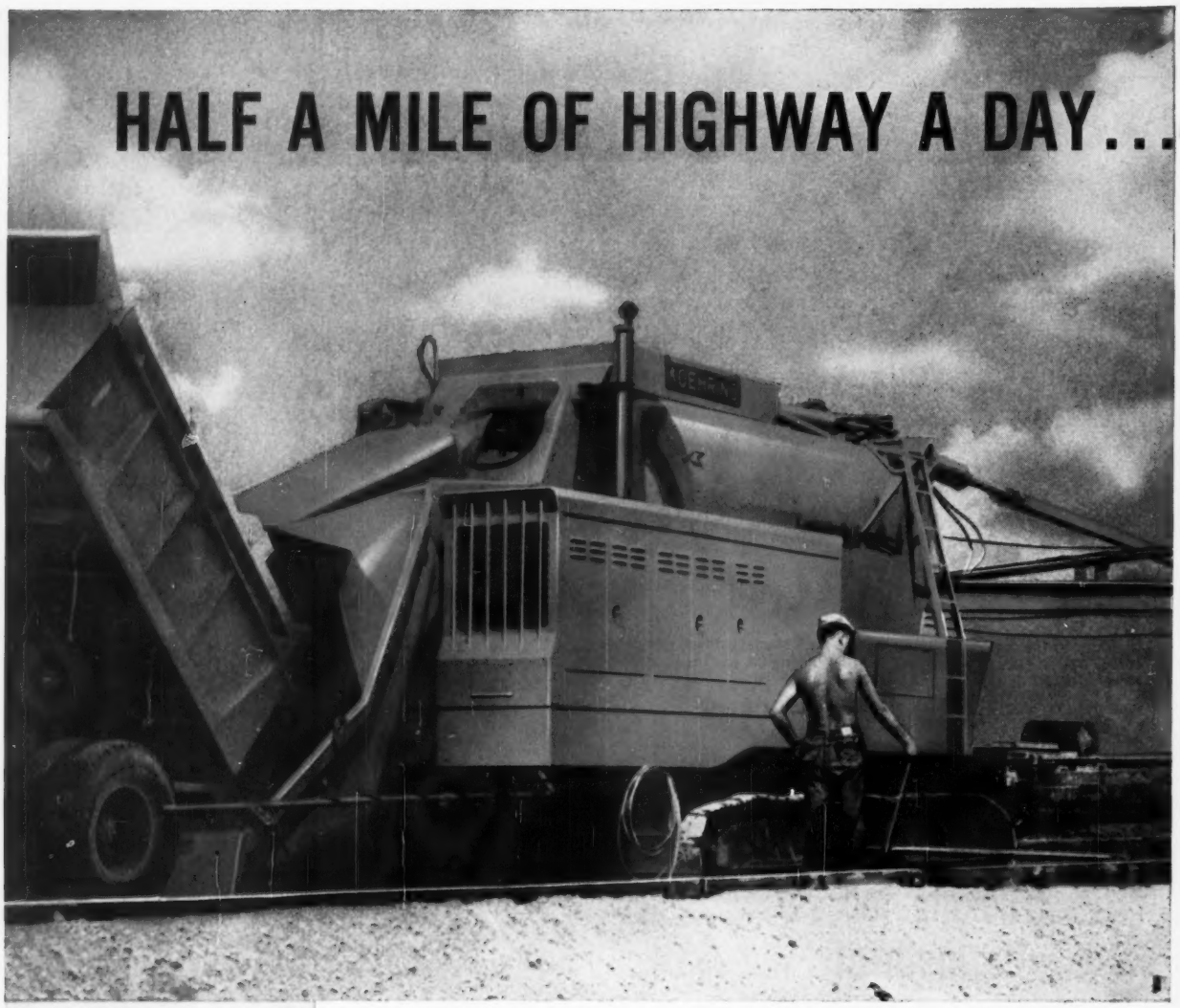
Among the first to get equipment through to the disaster area were crews from F & S Contracting Co., Butte, Montana, with a fleet of heavy-duty Mack dumpers. Day and night on a 24-hour-a-day basis, F & S, veteran of many tough jobs, hustled its Macks through axle-deep mud and water, up almost insurmountable grades and over jagged rock surfaces. Thousands of tons of rock were moved, and F & S reports the Mack trucks detailed to this back-breaking job took it all in stride.

Really tough assignments like this offer indisputable proof of the matchless stamina and dependability built into every Mack vehicle. Unusual or routine, Macks can always be depended on to handle the job efficiently and economically. There's a Mack branch or distributor in your area who will be glad to help you select the model designed to handle *your* important hauling jobs. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd., Toronto, Ont.

7301

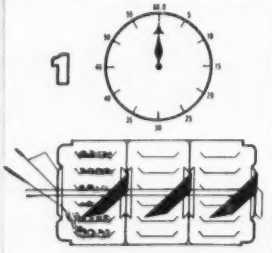
MACK
FIRST NAME FOR
TRUCKS

HALF A MILE OF HIGHWAY A DAY...

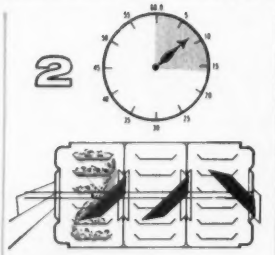


3-COMPARTMENT DRUM PRODUCES APPROX. 2 BATCHES OF CONCRETE (74.8 CU. FT.) EVERY MINUTE

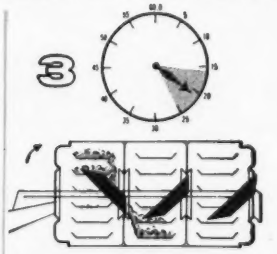
Note: Shaded area of clock shows interval of time required for each portion of mixing cycle illustrated. Arrow shows half-way point of elapsed time in each step. Position of transfer chutes, discharge chute, material, etc., is shown for that particular *instant* in the mixing cycle.



Skip raised automatically by Batchmeter (after release of safety device by man directing batch trucks into skip) . . . water starts into drum automatically . . . dry material flows into #1 compartment . . . Batchmeter set . . . mixing cycle begins at 0 seconds.

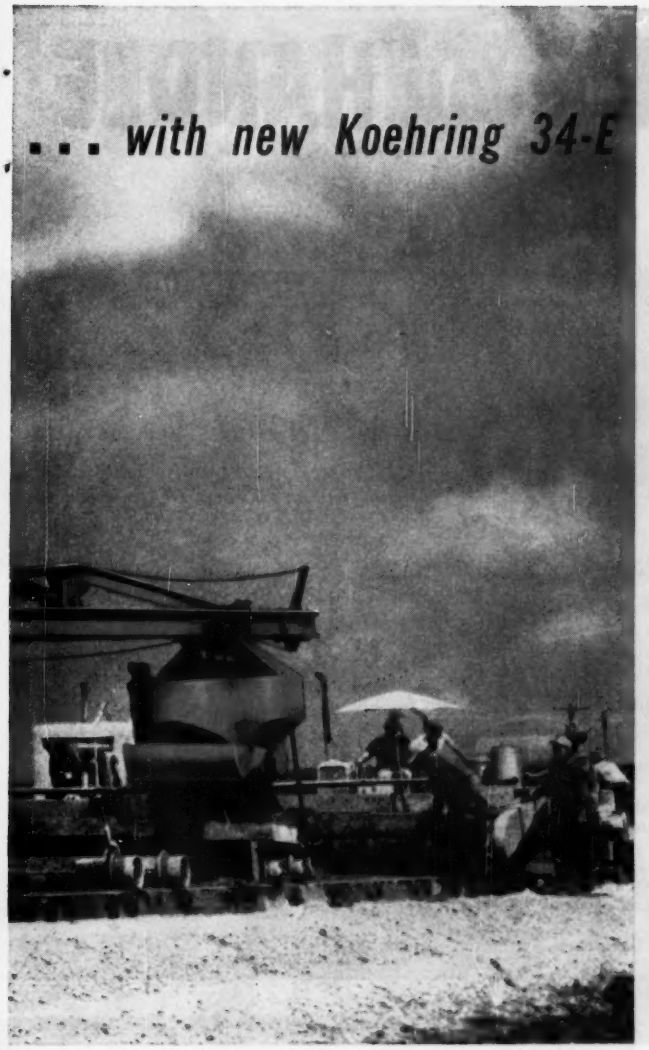


First batch mixing in #1 compartment . . . skip down, batch truck depositing material in skip . . . water-measuring tank being filled from supply tank.



First batch being mixed and transferred from #1 compartment to #2 compartment . . . skip starts up automatically (after safety release) with dry material for 2nd batch . . . water-flow for 2nd batch starts automatically as skip raises.

It pays to KEEP YOUR EYE ON KOEHRING!



TRIBATCH

To profitably bid and take paving contracts for 1960, be ready to compete production-wise, cost-wise with this new "break-through" in paver output: 2,580 lineal feet of 24-foot-wide, 9-inch-thick concrete pavement can now be laid in a 10-hour day with *one* 34-E paver — the new Koehring® three-compartment TRIBATCH!

43% MORE OUTPUT

with no change in your present batch plant, trucks, finishers

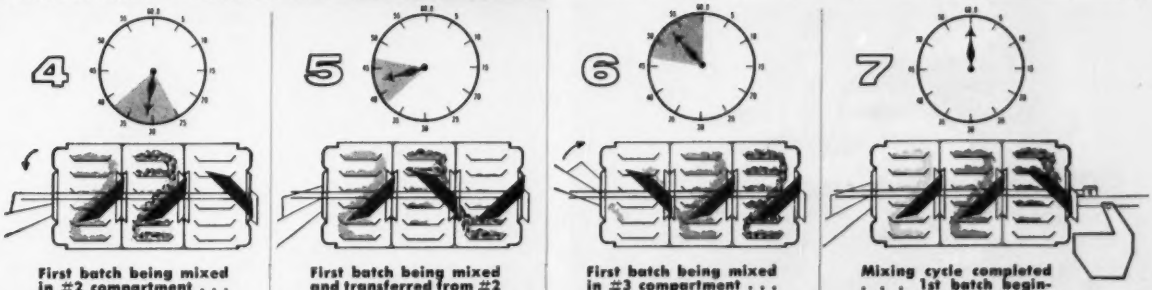
Size-wise, the 34-E TRIBATCH fits right in with your present paving spread — no need to modify or change existing batching, hauling, spreading, finishing equipment. (Only exception would be additional batch trucks, depending on length of haul.) Secret of high TRIBATCH output is in the continuous "assembly-line" production of its 3-compartment mixing drum. Here's the difference:

60-SECOND MIXING TIME

	34-E TRIBATCH	34-E dual-drum
Cycle time:	29 sec.	41.5 sec.
Batches per hour:	124	86.7
Yards per hour:	172	120

Consider what this 43% production increase can mean in your 1960 profit margin. Better be ready to *go* with a 34-E TRIBATCH. Call your Koehring distributor, or write today.

KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin



4 First batch being mixed in #2 compartment . . . 2nd batch being mixed in #1 compartment . . . skip is being lowered to receive additional material . . . water measuring tank is being filled from supply tank.

5 First batch being mixed and transferred from #2 compartment to #3 compartment . . . 2nd batch being mixed in #1 compartment . . . skip down, batch truck dumping material in skip . . . water-measuring tank being filled from supply tank.

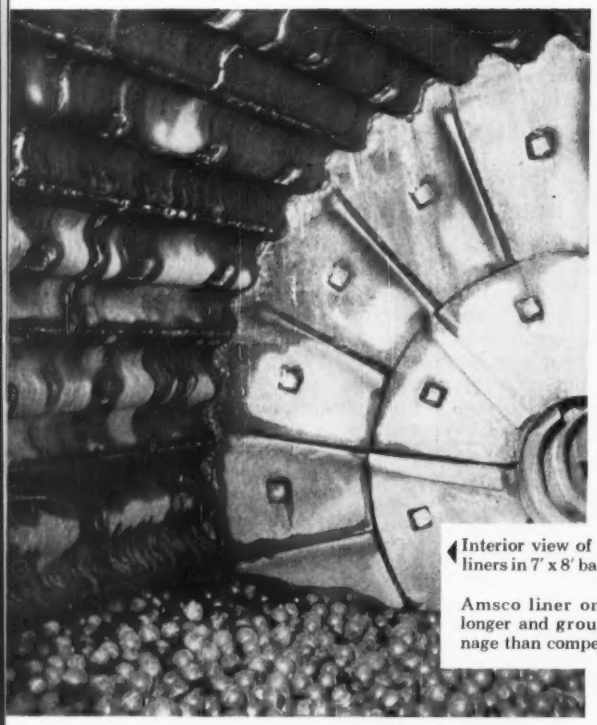
6 First batch being mixed in #3 compartment . . . 2nd batch has just finished transfer to #2 compartment and will continue to be mixed there . . . skip coming up for introduction of 3rd batch into #1 compartment . . . water-flow has just begun for 3rd batch.

7 Mixing cycle completed . . . 1st batch beginning discharge from drum into bucket . . . 2nd batch mixing in #2 compartment . . . 3rd batch mixing in #1 compartment . . . skip down ready to receive dry material for next batch . . . clock reads 60 seconds!

To: Koehring Division
3026 W. Concordia, Milwaukee 16, Wis.
Send: ☐ bulletin ☐ spec. sheet on 34-E TRIBATCH

NAME _____ TITLE _____
COMPANY _____ DIV. _____
STREET _____
CITY _____ STATE _____

How AMSCO helps you HANDLE



Interior view of Amsco double wave liners in 7' x 8' ball mill, using 2" balls.

Amsco liner on left lasted 123% longer and ground 134% more tonnage than competitive liner on right.

Bucyrus 88 D four-yard bucket, equipped with Amsco Simplex 2-part Teeth, removing rock for power station. All of Tuscarora Constructors' shovels used for rock excavation are equipped with Amsco Simplex Teeth.

MORE TONS PER DOLLAR

Read how AMSCO Mill Liners and Dipper Teeth are outlasting competitive parts in severe service

AT A LARGE NEW YORK ZINC MINE...

THEY'VE DOUBLED SERVICE LIFE WITH AMSCO CHROME-MOLY BALL MILL LINERS

Amsco double wave chrome-moly liners are used on an Allis-Chalmers 7′ x 8′ ball mill at this large northern New York zinc mine. The mill is operating *24 hours a day, six days a week*... grinding rod mill discharge consisting of sphalerite, pyrite and the balance silicate and limestone gangue.

These Amsco liners ground 670,000 tons during their 29-month life... as against an average of 286,000 tons and 13-month life for the type of liners previously used. That adds up to over *100% increase in service life*. In addition to their longer life, another fact that impresses the operators about Amsco liners is that there's no circumferential grooving until the very end of their service life.

TUSCARORA CONSTRUCTORS HAVE FOUND...

AMSCO 2-PART DIPPER TEETH ARE "BEST-WEARING TEETH WE'VE EVER USED"

At the Niagara Power Project, Tuscarora Constructors are building the power station and pumping station. They're digging almost entirely in rock, working their dippers 24 hours a day, six days a week.

Dell Lundmark, Equipment Superintendent for Tuscarora, was responsible for selecting Amsco 2-part reversible teeth for his dippers. He'd heard of their fine performance elsewhere, and now describes them as the "best wearing teeth we've ever used". He says the design of the teeth is very good for rock, and adds, "We're getting *15% to 20% longer wear* than from competitive 2-part teeth".

Approximately 10,000 tons of rock are handled before the teeth are turned over ... and tips are easy to replace when completely worn.

This combination of a new alloy steel, plus the design features engineered into the Amsco Simplex Teeth, are causing equipment superintendents everywhere to change to Amsco for better, lower cost digging.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

Other Plants in: Denver • Los Angeles • New Castle, Dela. • Oakland, California • St. Louis

In Canada: Joliette Steel and Manitoba Steel Foundry Divisions

YARDS ON

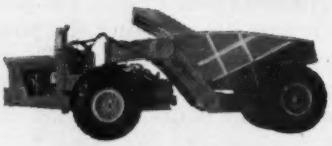
MODEL CW-220
20.0 cu. yds. STRUCK
27.0 cu. yds. HEAPED
INTERCHANGEABLE WITH MODEL CWD-221 REAR DUMP UNIT

MODEL CW-215
15.0 cu. yds. STRUCK
21.0 cu. yds. HEAPED
INTERCHANGEABLE WITH MODEL CWD-214 REAR DUMP UNIT

MODEL CW-27
7.0 cu. yds. STRUCK
10.0 cu. yds. HEAPED

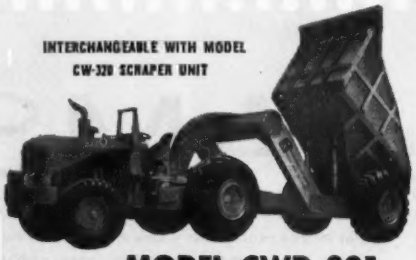
MODEL CW-226
26.0 cu. yds. STRUCK
36.0 cu. yds. HEAPED

MODEL CW-320
20.0 cu. yds. STRUCK
27.0 cu. yds. HEAPED
INTERCHANGEABLE WITH MODEL CWD-221 REAR DUMP UNIT



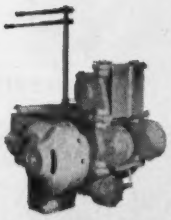
MODEL CWD-221
21.0 cu. yds. STRUCK
31.0 cu. yds. HEAPED
35-TON LOAD CAPACITY
INTERCHANGEABLE WITH MODELS:- CW-220

INTERCHANGEABLE WITH MODEL CW-320 SCRAPER UNIT



MODEL CWD-321
21.0 cu. yds. STRUCK
31.0 cu. yds. HEAPED
35-TON LOAD CAPACITY

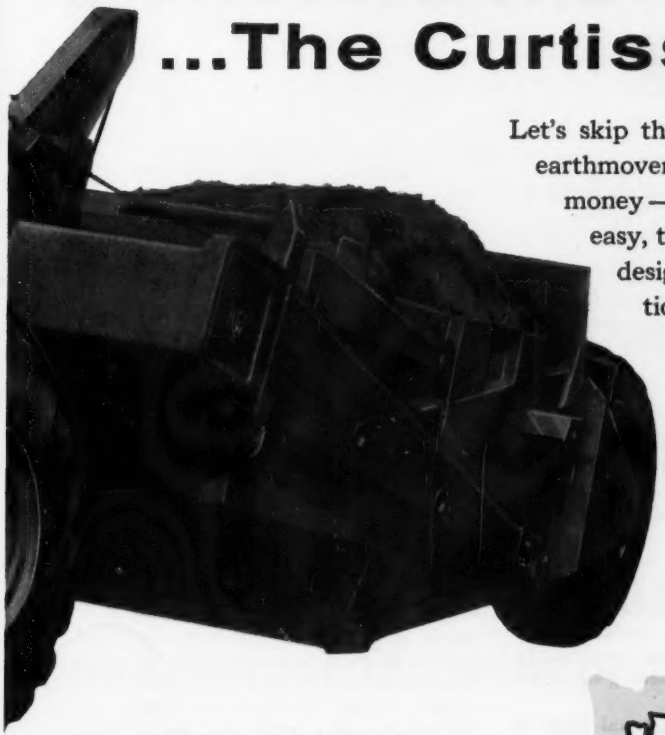
MODEL CWT-20
20.0 cu. yds. STRUCK
27.0 cu. yds. HEAPED



CABLE CONTROLS
for standard tractors in every horsepower range

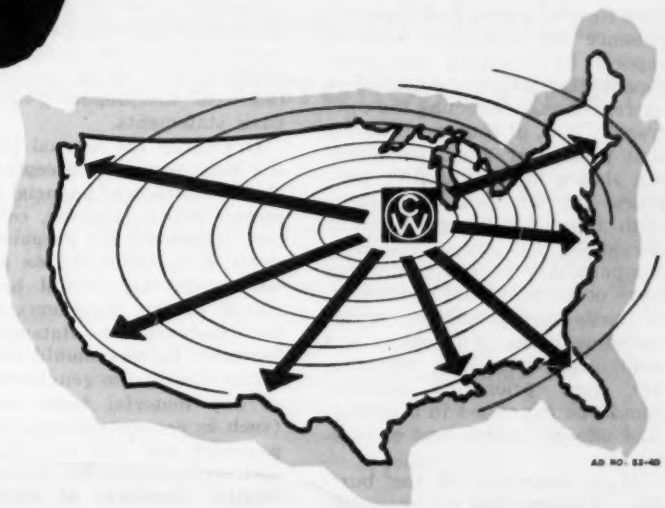
AHEAD

ANY EARTHMOVING JOB ...The Curtiss-Wright Line



Let's skip the details and get down to basic facts about earthmovers. If you move more dirt, you make more money — it's as simple as that . . . and just about as easy, too, with the modern Curtiss-Wright line. C-W design features for high performance, easy operation and low maintenance put you yards ahead in production — dollars ahead in profit on any earthmoving job. Call your Curtiss-Wright distributor for complete information and specs on the machine performance matched to your job requirements.

Your local Curtiss-Wright distributor is part of a nationwide sales, parts and service network devoted to making Curtiss-Wright users the most satisfied in the industry. You can depend on him for the most efficient, most cooperative service that it is possible to provide.



AD NO. 52-40

SOUTH BEND DIVISION, CURTISS-WRIGHT CORPORATION • SOUTH BEND, INDIANA

SOUTH BEND DIVISION
CURTISS-WRIGHT CORPORATION
SOUTH BEND, INDIANA

ACCOUNTING FOR CONTRACTORS

This is the last of three articles on accounting principles for contractors reprinted from a new booklet by the American Institute of Certified Public Accountants.

Form and Content of Financial Statements

Comparative Statements

The presentation of comparative financial statements in annual and other reports emphasizes that statements for a series of periods are more significant than for one period and, thereby, enhance the usefulness of such reports by bringing out more clearly the nature and trends of current changes affecting the contractor. It is, of course, necessary that prior-year amounts—which are shown for comparative purposes—be, in fact, comparable with those for the most recent period, or that any exception to comparability or changes which have occurred in the manner of, or basis for, presenting corresponding items be disclosed and explained. When it is appropriate, such prior-year amounts should be expressed in a manner that affords some means of comparison.

Many segments of the business of contracting are unusually hazardous and do not have the element common to most manufacturing enterprises of similar production. When the contractor's services change in nature or size, the comparability of the financial statements may be less significant. In such circumstances, it is more important to disclose and thereby distinguish changes in the business by separately labeling items in the financial statements, thus drawing them to the attention of the reader.

Cash vs. Accrual Basis Accounting

Although the cash basis for recording financial transactions is acceptable for some reportings, it is not acceptable for financial statements which purport to present financial position or results of operations when the cash basis accounting practices produce results which are materially at variance with those customarily followed in preparing accrual basis statements.

Ordinarily the accrual basis is the only generally accepted basis for contractors' financial statements. When, however, contractors' statements are prepared entirely or substantially on a cash basis, this fact should be disclosed in the statements or in their footnotes. The statements or footnotes thereto should also indicate clearly the general nature of any material items omitted (such as accounts receivable and payable) and the net effect of such omissions on the statements. Similar standards of disclosure should apply to such statements when prepared on a modified accrual basis.

Offsetting or Netting Amounts

It is a basic general principle of accounting that the offsetting of assets and liabilities in statements of financial position (or balance sheets) is improper except where a right of set-off exists. Thus the net debit balances for certain contracts should not ordinarily be offset against net credit balances relating to others, unless the offsetting balances relate to the same client of the contractor. A strict legalistic interpretation of the words, "the same client," is not intended here. Thus, where there is a close relationship, as in the case of contracts which are parts of the same project, the group may be treated as a unit in offsetting net debit and credit balances for statement presentation purposes.

The Institute's committee on accounting procedure recognized the basic accounting principle of offsetting as described above when it dealt with the two accepted methods of accounting for long-term construction-type contracts. Thus, in discussing the percentage-of-completion method, the bulletin states:

> . . . current assets may include costs and recognized income not yet billed, with respect to certain contracts; and liabilities, in most cases current liabilities, may include billings in excess of costs and recognized income with respect to other contracts.

And, in commenting on the completed-contract method, the bulletin states:

> . . . an excess of accumulated costs over related billings should be shown in the balance sheet as a current asset, and an excess of accumulated billings over related costs should be shown among the liabilities, in most cases as a current liability.

Reaffirmation of the theory of offset is to be found in the further statement by the committee

Geared by Fuller with off-highway '1220 Series Transmission . . .

Faster work cycles with countershaft brake and longer life with pressure filtration system

Eight Allis-Chalmers TS-260 Scrapers with Fuller off-highway '1220 Series Transmissions are boosting profits for Ben Haskins Construction Company on Oklahoma highway projects. All 8 of Haskins' '1220 Series Transmissions are equipped with Air-Powered Countershaft Inertia Brakes and Pressure Filtration Systems for the gear oil.

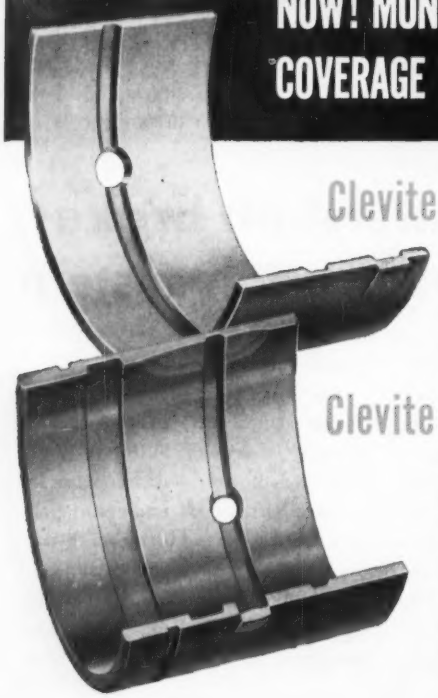
President Ben Haskins says, "Fuller '1220 Transmissions have helped make our operation more profitable. They're trouble-free. The transmission countershaft inertia brake permits quick, easy upshifts without double clutching. Faster shifting gives us faster work cycles . . . the pressure filtration system for the gear oil prolongs gear and bearing life . . . I'll insist on both the brake and the pressure filtration system when I buy equipment in the future."

For long life, easy shifting and positive lubrication in your scraper operations, specify Fuller off-highway Transmissions which include the countershaft inertia brake and pressure lubrication and filtration systems as standard equipment. Ask your dealer about these new features designed to provide *you* with a better margin of profit.

FULLER — TRANSMISSION DIVISION — MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla. Automotive Products Company, Ltd., Brock House, Langham Street, London W.1, England, European Representative

NOW! MONMOUTH OFFERS COMPLETE ENGINE BEARING COVERAGE TO THE CONSTRUCTION FIELD



Clevite 77 BEARINGS

CLEVITE 77, with patented cast copper lead tri-metal construction, provides greater load carrying capacity, longer life.

CLEVITE 77 (the bearing preferred by O.E.M.) saves time and money with more hours of service, lower maintenance costs.

Clevite ALUMINUM BEARINGS

Now! A full line of Steel Backed and Solid Aluminum bearings (identical to original equipment in design and materials) is available for ALL special earthmoving equipment.

A complete range of undersizes will give you up to four regrinds, extending crankshaft life.

The coverage, availability and service you receive from your NAPA Jobber makes it easy for you to use the best —CLEVITE—from the world's leading original equipment manufacturer.

For your nearest jobber, contact one of the NAPA warehouses listed on opposite page

MONMOUTH *Engine Bearings*

CLEVITE SERVICE: Cleveland Graphite Bronze • *Division of Clevite Corporation* • Cleveland 3, Ohio

Monmouth
ENGINE BEARINGS

NAPA Atlanta
200 Baker Street, N.E.
P. O. Box 6006, Station H
Atlanta, Georgia

NAPA Birmingham
500 South 23rd Street
Birmingham 2, Alabama

NAPA New England
325 Vassar Street
Cambridge 39, Mass.

NAPA Buffalo
1339 Main Street
Buffalo 9, New York

NAPA Charleston
410 58th Street, S.E.
Charleston 31, West Virginia

NAPA Charlotte
2711 Wilkinson Boulevard
Charlotte, North Carolina

NAPA Chicago
515 West 35th Street
Chicago 16, Illinois

NAPA Cleveland
1458 East 55th Street
Cleveland 3, Ohio

NAPA Columbus
845 Grandview Avenue
Columbus 8, Ohio

NAPA Dallas
1719 North Harwood
Dallas 1, Texas

NAPA Denver
P.O. Terminal Box 5386
Denver 17, Colorado

NAPA Des Moines
12th & Mulberry Streets
Des Moines 9, Iowa

NAPA Detroit
101 Selden Avenue
Detroit 1, Michigan

NAPA Fresno
666 L Street
P. O. Box 1026
Fresno 1, California

NAPA Grand Rapids
323 Ionia Avenue, N.W.
Grand Rapids 2, Michigan

NAPA High Point
P. O. Box 5029
Richmond, Virginia

NAPA Hawaiian
747 Ilaniwai Street
P. O. Box 1599
Honolulu 6, Hawaii

NAPA Houston
1717 Pierce
Houston 3, Texas

NAPA Indianapolis
424 North Illinois Street
P.O. Box 635
Indianapolis 4, Indiana

NAPA Jacksonville
1090 Haines Street
Jacksonville 1, Florida

NAPA Kansas City
2701 Main Street
Kansas City 8, Missouri

NAPA Los Angeles
600 East Washington Boulevard
Los Angeles 15, California

NAPA Louisville
Brooks & Jacob Streets
P. O. Box 180
Louisville, Kentucky

NAPA Memphis
801 East Georgia Avenue
Memphis 2, Tennessee

NAPA Miami
104 N. E. 13th Terrace
Miami, Florida

NAPA Milwaukee
767 N. Jackson Street
Milwaukee 2, Wisconsin

NAPA Minneapolis
50 Spruce Place
Minneapolis 3, Minnesota

NAPA New Orleans
855 Baronne Street
New Orleans 13, Louisiana

NAPA New York
517 West 59th Street
P. O. Box 318
Radio City Station
New York 19, New York

NAPA Oakland
401 27th Street
Oakland 12, California

NAPA Oklahoma City
700 South Western
Box 1821
Oklahoma City 4, Oklahoma

NAPA Omaha
2027 Harney Street
Omaha 2, Nebraska

NAPA Philadelphia
1600 Hunting Park Avenue
Philadelphia 40, Penna.

NAPA Phoenix
324 West Adams Street
Phoenix 1, Arizona

NAPA Pittsburgh
5620 Penn Avenue
Pittsburgh 6, Penna.

NAPA Portland
3241 N. W. Industrial
Portland 10, Oregon

NAPA Richmond
1302 MacTavish Avenue
Richmond 20, Virginia

NAPA Salt Lake City
28 S. W. Temple Street
Salt Lake City 1, Utah

NAPA San Antonio
710 Broadway
San Antonio 5, Texas

NAPA San Diego
1123 Island Avenue
P. O. Box 829
San Diego 12, California

NAPA San Francisco
25 Division Street
San Francisco 3, California

NAPA Seattle
2700 4th Avenue, South
Seattle 4, Washington

NAPA Spokane
126 South Sheridan Street
P. O. Box 1444
Spokane 6, Washington

NAPA St. Louis
3301 Locust Street
St. Louis 3, Missouri

NAPA Syracuse
345 Peat Street
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Your NAPA Jobber is a Good Man to Know!

relative to the completed-contract method as follows:

> If the costs exceed billings on some contracts, and billings exceed costs on others, the contracts should ordinarily be segregated so that the figures on the asset side include only those contracts on which costs exceed billings, and those on the liability side include only those on which billings exceed costs.

The Institute committee undoubtedly considered the theory of offset to be equally applicable to the percentage-of-completion method, but probably did not specifically use language paralleling that which is quoted above relative to the complete-contract method, as such a statement would be redundant.

The above quotations from Accounting Research Bulletin No. 45 do not indicate, through the suggested mechanics of segregating contracts that are classifiable as current assets from those that are current liabilities, whether billings and related costs should be presented separately or combined (or netted).

As separate disclosures in comparative statements can be informative of the status of dollar volume of billings and costs (but not an indication of future profit or loss thereon), this reporting practice is believed to be preferable. In addition, grantors of credit, such as banks and insurance companies, have expressed preference for separate disclosure. This may be accomplished through "short extension" of the amounts on the statement of financial position or disclosure in the notes to the financial statements.

Under the percentage-of-completion method, the current assets may disclose separately total costs and total recognized income not yet billed with respect to certain contracts; and current liabilities may disclose separately total billings and total costs and recognized income with respect to other contracts. The separate disclosure of revenue and costs in statements of income is, of course, generally accepted. Only through comparable presentation of such data in the statement of financial position can the reader adequately evaluate the contractor's comparative position.

An advance received on a cost-plus contract is usually not offset unless it is definitely regarded as a payment on account of work-in-progress, in which event it will be shown as a deduction from the related asset. Advance amounts offset should, of course, be disclosed.

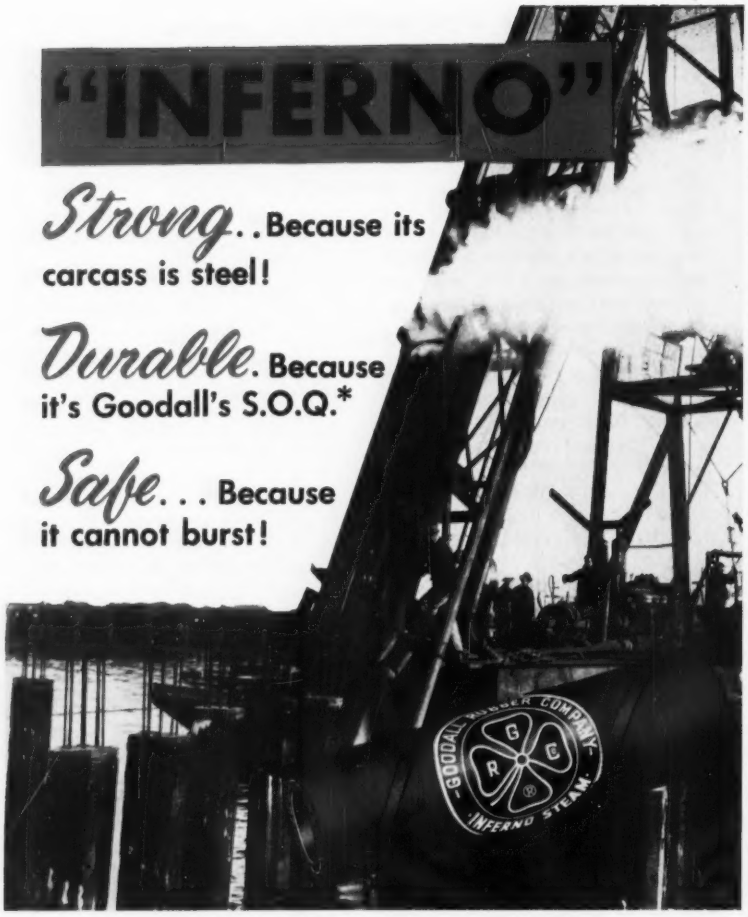
Such advances generally are made for the purpose of providing a revolving fund and are not usually applied as a partial payment until the contract is nearly or fully completed. However, when a terminated government contract is one on which advance payments had previously been received, the financial statements of the contractor issued before collection of the claim should ordinarily reflect any balance of those advances disclosed as deduction from the claim receivable.

The Institute committee recommends that provision be made for the loss on a contract when current estimates indicate expected losses. (Commented on earlier under the subheading, Provision for Foreseeable Losses, etc.) The total provision for such losses, which might be termed "estimated loss on uncompleted contracts," should be disclosed in the statement of financial position or notes thereto and not "netted" without disclosure.

Such allowances should be shown in total as reductions of those contract costs includable in current assets or additions to those includable in current liabilities. An allowance for loss may, of course, change a contract which would otherwise be includable in current assets to one includable in current liabilities because it represents costs for which the contractor will not be reimbursed.

Disclosure of Accounting Basis for Recording Income

The selection of a method of accounting for income by contractors has been commented on, and it was observed that it may be appropriate in some circumstances to select and use both accepted methods. Specific disclosure of the method which is used should be made either in a footnote or in the terminology employed in the financial statements. An indication such as "accrual basis" is not sufficient



*"Standard of Quality"

Pile Driver STEAM HOSE

Contractors specify Goodall "Inferno" Steam Hose because of its outstanding strength, durability and safety on the most demanding pile driving operations and in other heavy-duty steam applications. Built with layers of tightly-braided steel wire bonded to a heat-resistant tube and a tough, wear-resistant red rubber cover . . . a very strong yet flexible construction. If damaged, the special wire braid carcass retards escape of steam—no violent burst—*real safety* for equipment and personnel. For pressures to 200 lbs., temperatures to 400°F. Sizes, ½" to 3", I.D. Maximum lengths of 50 feet.

"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch, or Write for Catalog

Standard of Quality—Since 1870

HOSE • BELTING • FOOTWEAR • CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES.
IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

ACCOUNTING FOR CONTRACTORS . . . *continued*

disclosure as both the percentage-of-completion and completed-contract methods use accrual basis accounting. Disclosure of the use of the completed-contract method is sufficiently self-explanatory. However, a statement that the percentage-of-completion method has been used without an indication of how this method is employed would not seem to be a sufficient disclosure as in practice this method is applied in a variety of ways, some of which tend to be less reliable than others. When the percentage-of-completion method is used, then the financial statements should include a note. Example:

> The company records profits or losses on its long-term contracts through estimates on the percentage-of-completion basis. The basis on which such profits or losses are recorded prior to completion is, when progress thereon reaches a point where experience is believed to be sufficient to establish estimates reasonably indicative of final results (such point is in no case less than 25% of completion), to accrue as an estimated ultimate loss, the full amount thereof, and as to an estimated profit, that portion which is deemed allocable, on the basis of engineers' estimates of the percentage-of-completion, to expenditures incurred and work performed. Income from short-term contracts is recorded on substantial completion of each contract.

The most acceptable methods for recording income are likely to differ under the two basic types of contracts (namely, cost-plus, in its variety of forms, such as cost-plus percentage of cost, cost-plus fixed fee, these with or without guaranteed maximum billings—and fixed price or lump sum). Therefore, it is usually desirable not only to segregate total amounts to each type of contract in relating the financial statements, but to indicate the methods adopted for recording income thereon.

Supplemental Financial Information

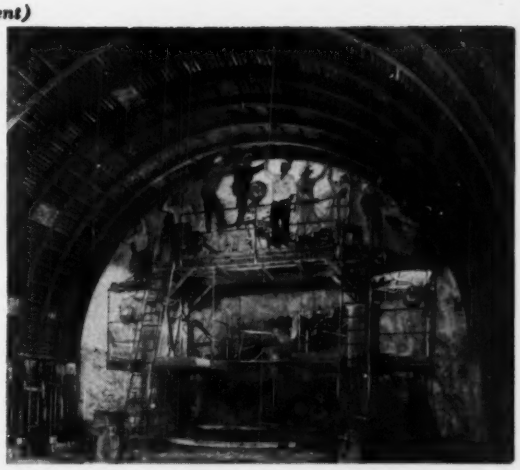
Mention has been made of the desirability of disclosing the following matters in the financial statements of a contractor:

continued on page 144

(Advertisement)

TUNNEL PORTAL for two-lane vehicular traffic through mountainous San Gabriel Canyon.

INSIDE FLANGES of liner plates are bolted to the web of arch ribs. Erection of components is fast; fit is certain; and joining with quick-acting, coarse threaded bolts is positive and rapid.



"SAFETY FOR TRAFFIC" is spelled out in extra strength of COMMERCIAL's tunnel support system. Note: Posts set in unsupported roof section to receive future arch support as conditions may require.

How to Support Rock Tunnels in Earthquake Area

A major 10-tunnel highway project through a 6500 ft. mountainous terrain will soon speed up shipment of products from Antelope Valley to the nearby, fast growing Los Angeles market. Highway authorities have noted that motorists driving through those tunnels already completed in this frequently earth tremored area have a sense of safety reassurance due to the solid protective appearance of the exposed steel tunnel support system.

To keep the project rolling on schedule, the Los Angeles County Highway Department has specified COMMERCIAL steel ribs and liner plates. They know from past experience on other tunnel projects that all fabricated parts—ribs, liner plates, wall beams, posts and bolts—arrive on the job accurately fabricated to quickly "button up" the COMMERCIAL tunnel support system.

Fast erection of the steel supports in sections of the new 34 ft. wide, 2-lane tunnels is mighty important, too. Arch ribs and plates, sized for easy handling, are raised by a cable sling on a power shovel and set by crews working from a drilling jumbo. Two-piece arch ribs are placed with staggered joints at the crown. Liner plates have corrugations to give them added strength for lagging and their continuous inside flanges are bolted to the web of the ribs . . . spaced on 3 ft. centers.

Back-packing is placed to fill all voids between the excavated rock and the liner plate lagging. Then grouting is pumped to fill all small voids in the back-packing. Thus, uniform loading is placed on the entire arch.

The full advantages of any COMMERCIAL tunnel support system start with COMMERCIAL's engineering assistance. With 35 years experience, they may well be able to help you speed up and simplify your next tunnel job, whether vertical, surface, sub-surface, soft or hard ground. For complete details, please write to Commercial Shearing & Stamping Company, Dept. **B-1,** Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

Existence of renegotiation refunds, termination claims and claims of subcontractors; the nature of changes in a contractor's business; utilization of cash, rather than accrual, basis of accounting amounts provided for contract losses; method of income realization, supplemental information on joint venture operations; amounts of intercompany transactions; amounts of rental commitments; depreciation policies; etc.

Disclosure should also be made of such additional matters as unusual labor agreements; material purchase or sale commitments; hypothecated assets; loan agreement restrictions; and penalty or or guarantee provisions of construction contracts. In addition to the required disclosures mentioned above, it is most informative to supplement a contractor's regular financial statements with information of a statistical nature on movement of contracts. Such information can take the form of indicating the total amount of contracts in progress at the beginning of the year, new contracts entered into during the year, contracts completed during the year and total amount of contracts in progress at the end of the year.

It is helpful to have this information in a comparative form. It is also desirable, in some instances to disclose the constituent parts of such information; for example, to show different classes of projects on which the contractor is engaged, or separate listings of domestic and foreign operations, etc. It should be noted that supplementary information of this nature is very much desired by credit grantors.

Forms issued by grantors of credit and many state road and highway departments often require further details of certain financial information. Observance of the accounting principles herein reviewed and the suggested form and content of a contractor's financial statements should result in a fair presentation of his position and results of operations. However, the contractor and his accountant should acquaint themselves with the requirements called for by these forms and be prepared to supply the necessary supporting details.

Joint Ventures

As a means of spreading risks and pooling financial resources and skills for certain jobs, it is common for contractors to join forces through the use of a joint venture, a form of partnership. The members of the joint venture may be either sole proprietor-ships, partnerships, or corporations, but the joint venture itself is a separate business entity for which separate accounts are usually kept.

Each member of the joint venture usually contributes capital and may have accounts receivable from the joint venture for equipment rentals, engineering, architectural or other services, sales of material and other items. It is also common for the participants to bill the joint venture for interest on capital invested, accounting and on the overhead expenses incurred on behalf of the joint venture. The methods for reimbursing and compensating the participants are usually provided for in the joint venture agreement.

The investment of a contractor member in a joint venture as well as receivables from the joint venture should be separately disclosed in his financial statements if these items are material in amount. It is sometimes possible to separate the investment in a joint venture and receivables therefrom into current and noncurrent portions based upon the underlying assets of the joint venture (see section 7 Working Capital). The contractor's share of joint venture earnings should be shown separately in the income statement of the contractor. It is not common to record the proportionate share of billings and costs applicable to joint venture operations in the financial statements of individual members.

The joint venture should make its own election as to the method of recording income on its construction contracts, and this method can differ from the methods used by members of the joint venture in their financial statements. The approach to the selection of a method for recording income of a joint venture should be the same as that for recording income under contracts.

Each member of the joint venture may record his share in the income or losses of the joint venture for the fiscal year of the joint venture ending in the fiscal year of the member. However, members may elect to record income or losses of the joint venture as reports on joint venture operations are received.

If the venture income or investment is financially significant with respect to the contractor's own operations, it is preferable to include the separate financial statements of the venture with the financial statements of the contractor.

The venture financial statements should, of course, disclose the method of recording income and the other matters referred to in the preceding subsection. If separate financial statements are not provided, it is generally advisable to set forth in a footnote to the contractor's financial statements a summary of the assets and liabilities of the joint venture if the investment in the joint venture is material.

Conclusion

The development of accounting principles over recent years has logically led to a demand for a larger degree of uniformity. A definition of the word "uniformity" suggests similar treatment of the same item occurring in many cases. In this sense the risk is run of concealing important differences among cases.

As mentioned early in this booklet, the accounting profession has been and is aware of divergencies in accounting. It also acknowledges that diversity of practice will continue as new practices are adopted before the old ones are discarded completely. It is hoped that the assembly in this booklet of the profession's present concepts of accounting principles for contractors will limit existing areas of difference in accounting practices, contribute to a better understanding of such principles, and result in improved presentations of financial statements of contractors.

Delta Construction Co. underbids competition on $350,000 in contracts . . . gives credit to extra speed, power and maneuverability of

5 CASE® TERRAMATIC® DRIVE CRAWLERS

CERTIFIED FLEET OWNER REPORT

Turn the page for more details ——→

C. L. NORRIS, Delta Construction Co., reports:

"We cut overall dirtmoving costs 35% by CASE® TERRAMATIC® DRIVE

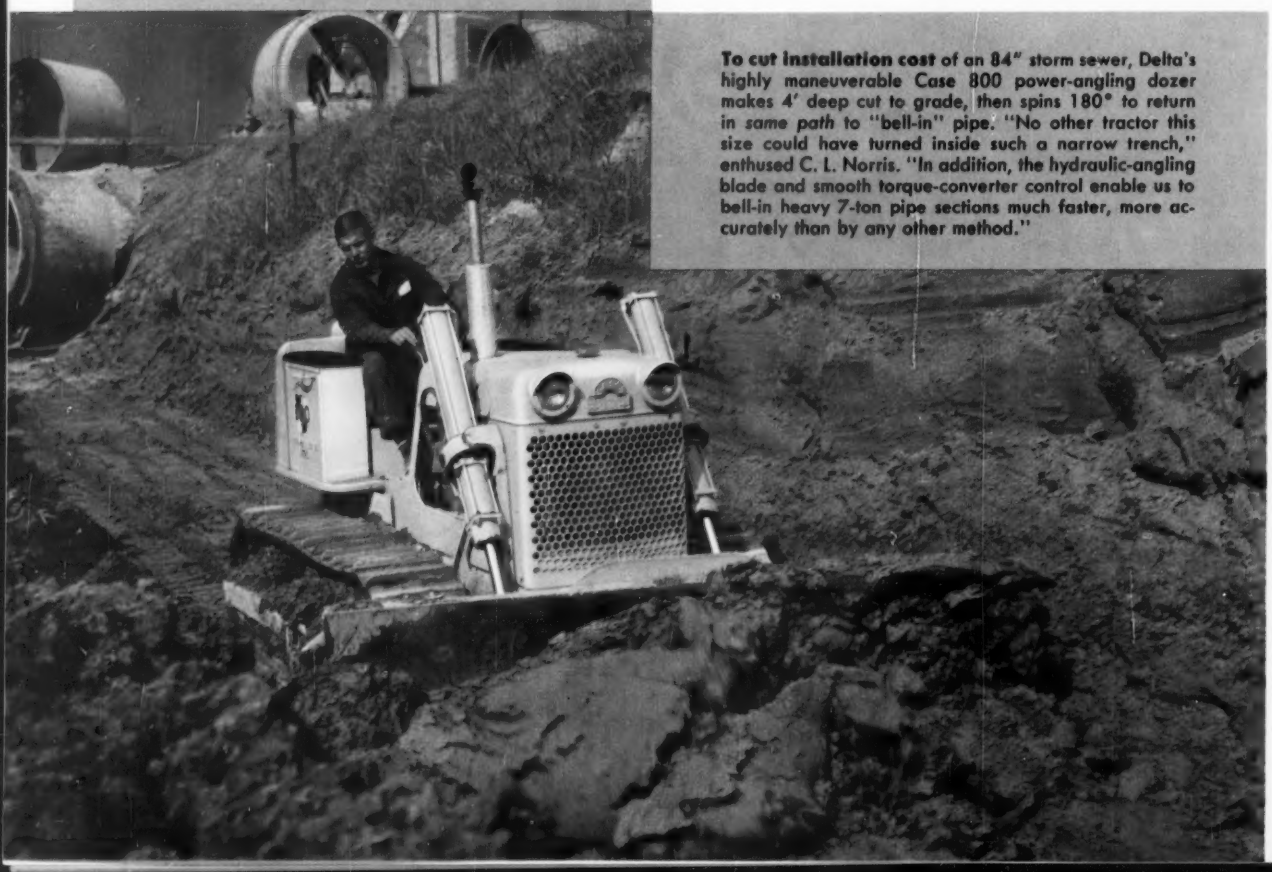
C. L. Norris (second from right) and sons — Virgil (right), and C. W. (left) — check specifications of new Case machine with Chester Johnson, Sales Engineer for Case Dealer — Southland Tractors, Inc., Memphis, Tenn. Jim Norris, third son in the Delta partnership, was in another part of the city, supervising storm sewer job shown below, when this picture was taken.

"The extra power and working-speed of Case tractors permits them to almost <u>double</u> the output of any crawler near their size or price!"

C. L. NORRIS, and his three sons — who operate as equal partners in Delta Construction Co., Memphis, Tenn. — have *owned or operated all leading makes of crawler tractors.* Mr. Norris pointed out, "It wasn't until we made-the-break to Case Terramatic Drive that we started making real money."

Mr. Norris goes on to explain, "With Terramatic Drive crawlers, we've been able to cut overall dozing and truck-loading costs as much as 35%. This has permitted us to underbid all competition on *every* job we've gone after — handle more jobs per year — and still come out with a *profit.*"

Delta's operators agree that the combination of *automatic torque converter and constant-mesh, power-shift Terramatic transmission* beats anything they've seen for speed and easy-handling on the job. Typical



To cut installation cost of an 84" storm sewer, Delta's highly maneuverable Case 800 power-angling dozer makes 4' deep cut to grade, then spins 180° to return in *same path* to "bell-in" pipe. "No other tractor this size could have turned inside such a narrow trench," enthused C. L. Norris. "In addition, the hydraulic-angling blade and smooth torque-converter control enable us to bell-in heavy 7-ton pipe sections much faster, more accurately than by any other method."

making-the-break to CRAWLERS"

operator comment: "These Case rigs shift by themselves (no clutching) . . . never stall . . . and we can power-turn 'em on a dime with those counter-rotating tracks. We load trucks on the fly without stopping."

147,000-yd. contract completed 60 days ahead of schedule. In addition to handling numerous other important jobs, Delta's *"Case tractor-fleet"* recently completed "Project Tenn. 1-12", involving 125,000 cu. yds. of earth and 22,000 cu. yds. of concrete work, *60 days ahead of the Housing Authority's estimate.* C. L. Norris adds proudly, "We'd never have been able to do it with conventional clutch-type crawlers. The higher-speed Case Terramatic rigs performed beyond our expectations, and we are happy to report that *service from our Case Industrial Dealer — Southland Tractors, Inc. — has been first rate on all counts.*"

CHECK LIST OF DELTA'S EQUIPMENT SPREAD

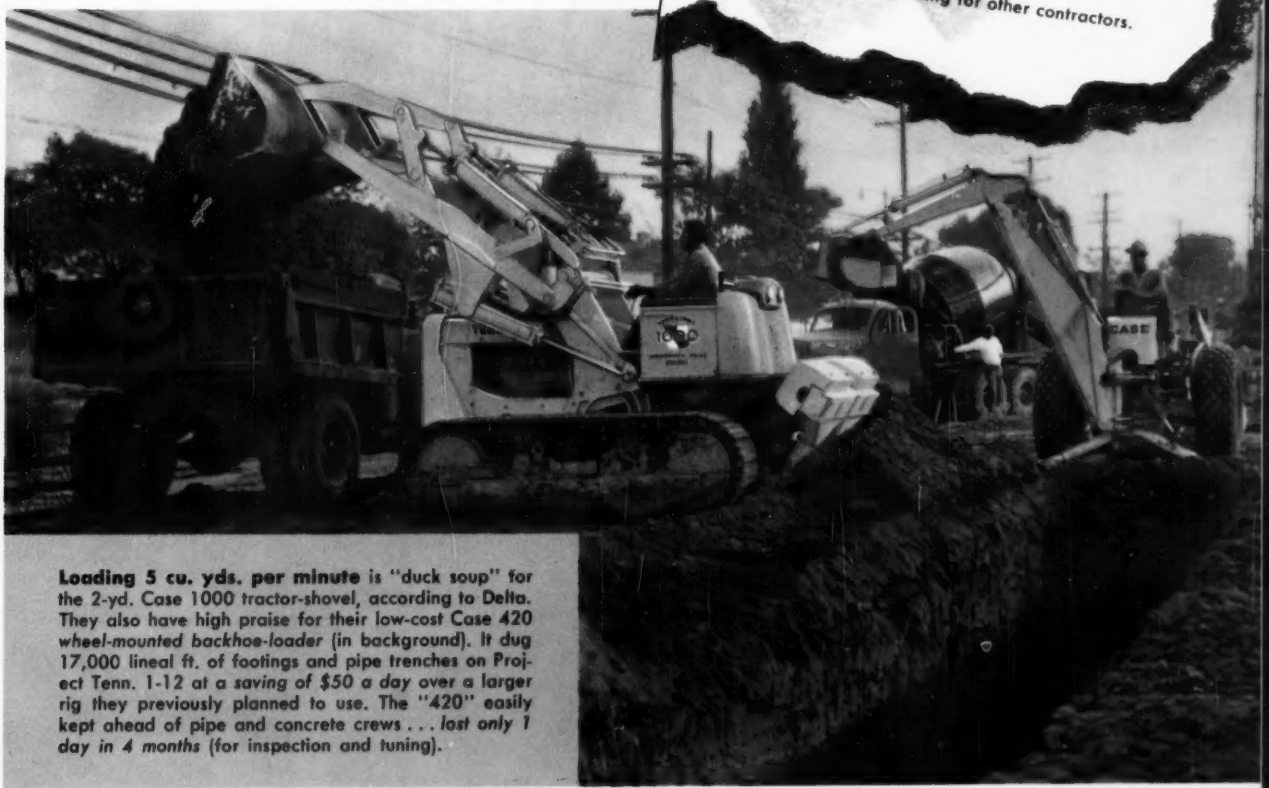
2 CASE Model 1000 tractor-shovels
1 CASE Model 1000 Power-Tilt Dozer
1 CASE Model 800 Power-Tilt Dozer
1 CASE Model 800 Power-Angling Dozer
1 CASE Model 420 Backhoe-Loader (Wheel)
1 Competitive make 2-yd. tractor-shovel*
1½-yd. self-propelled dragline
13 Dump trucks (6 to 8-yd. cap.)
5 Pick-up trucks

*Used without a bucket — primarily for pulling sheepsfoot roller.

MAJOR 1959 DELTA CONTRACTS

(Total: over $350,000)

1. Clearing, filling, grading, trenching and footings for Project Tenn. 1-12 — 300-family low-rent housing project for Memphis Housing Authority.
2. Site preparation for Memphis Medical Center addition (10,000 cu. yds.).
3. Site preparation for large trailer court (20,000 cu. yds.).
4. Installing 1000' of 84" storm sewer for City of Memphis.
5. Cutting 5 blocks of city street to grade and excavating for curbs and gutters.
6. Trenching for 6000' sanitary sewer.
7. 15 city blocks of grading for other contractors.



Loading 5 cu. yds. per minute is "duck soup" for the 2-yd. Case 1000 tractor-shovel, according to Delta. They also have high praise for their low-cost Case 420 *wheel-mounted backhoe-loader* (in background). It dug 17,000 lineal ft. of footings and pipe trenches on Project Tenn. 1-12 at a *saving of $50 a day* over a larger rig they previously planned to use. The "420" easily kept ahead of pipe and concrete crews . . . *lost only 1 day in 4 months* (for inspection and tuning).

Find out for yourself! A comparative Work-Test will prove it makes sense to make-the-break to CASE →

CASE®

TERRAMATIC® DRIVE

- *Speeds up* crawler work-cycles
- *Eliminates* clutching and shifting
- *Cuts* operator fatigue for more output per shift

Call your CASE Dealer for a demonstration

When successful contractors, like Delta Construction Co., Memphis, Tenn., suddenly *switch* to Case Terramatic Drive crawlers — and buy them in *"fleets"* — they must have sound *dollars and cents reasons*. See for yourself on your own job. Make a demonstration date today, and *compare* the profit-making difference!

Don't worry about cash!

Your Case Industrial Dealer will gladly arrange an easy monthly financing or lease plan, with seasonal "skip-payments" to fit your requirements. Mail coupon for complete facts.

MAIL TO:

J. I. CASE CO.,

Dept. A1110, Racine, Wis., U.S.A.

Yes, I'm interested in a proof-demonstration of a Case Terramatic Drive crawler with:

☐ Tractor-Shovel ☐ Tilt-Dozer ☐ Power-Angling Dozer

Also send literature on: ☐ Model 600 ..... (Equipment)

☐ 420 Crawler ..... (Equipment) ☐ 420 Wheel Backhoe-Loader

☐ M-420 Fork Lift ☐ W-5 ☐ W-9 ☐ W-10 ☐ W-12

Name ..... Title .....

Company .....

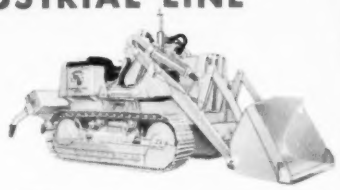
Address .....

City ..... Zone ..... State .....

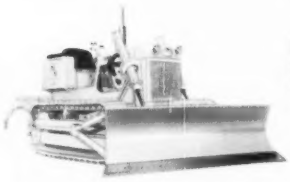
Litho in U.S.A. CT-CL-401N

CASE®
J.I. Case Co., Racine, Wis.
World-wide Sales and Service

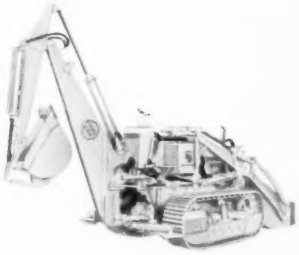
Check the complete CASE INDUSTRIAL LINE



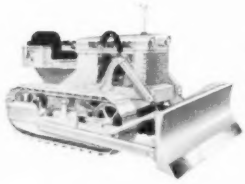
1000
100 hp* diesel engine. Case Terramatic Drive. Torsion-bar track suspension.



800
80 hp* diesel engine. Case Terramatic Drive. Torsion-bar track suspension.



600
62 hp* diesel or gas, with torque converter, 4-speed hydraulic power-shift transmission and power-steering.



420 Crawler
42 hp* gasoline engine. Ferrometallic clutch; 3-speed gear transmission. Improved total-contact differential steering.

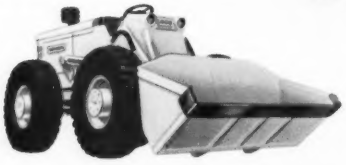
420 Wheel
47 hp* gasoline engine. Torque converter, 8-speed shuttle-shift transmission. Hydraulic power-steering.

M-420
4000-lb. capacity wheel fork lift. 9½', 14'3" or 21'6" mast. 47 hp* gas engine. Torque converter. 8-speed shuttle transmission. Hydraulic power-steer.

W-5 Terraload'r®
3000-lb. capacity, front-wheel-drive, rear-wheel power-steer. 1 or 1½-cu. yd. bucket. Torque-converter drive. Power shift.

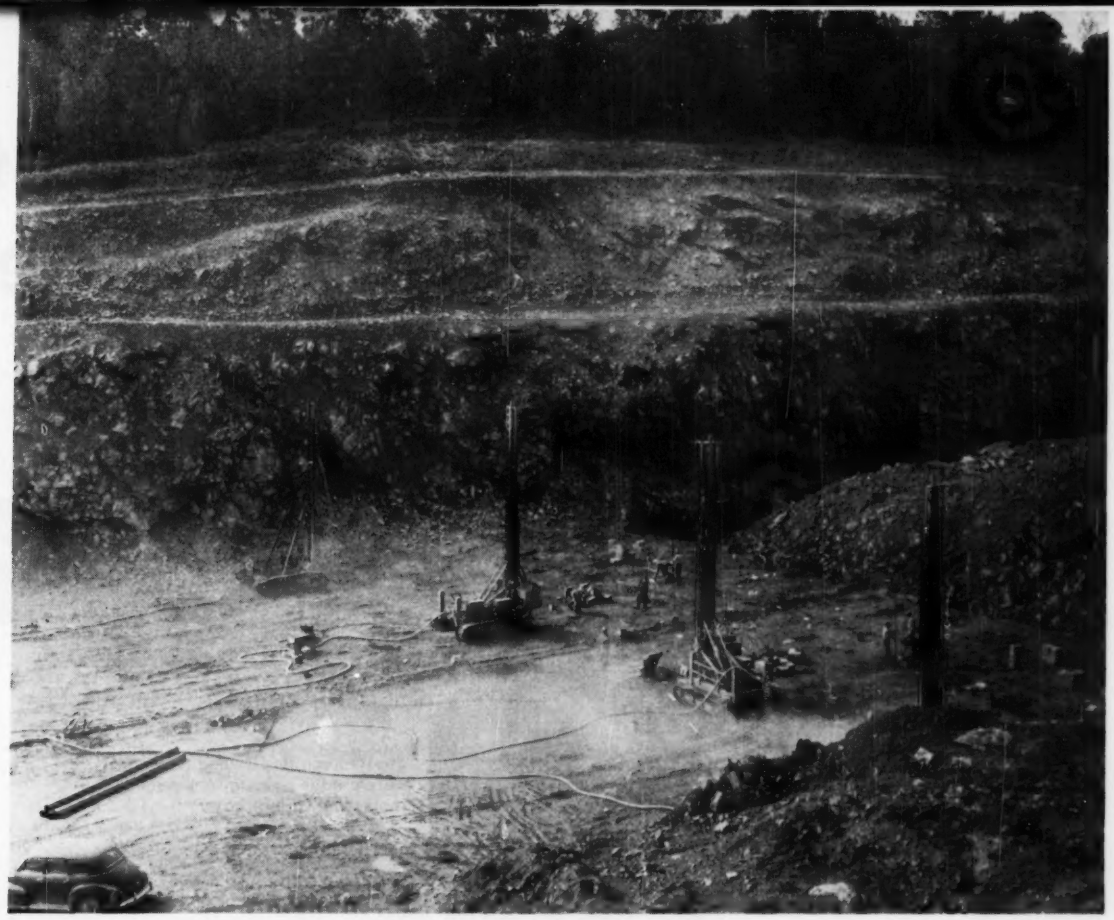
W-9 Terraload'r
5500-lb. capacity, 4-wheel-drive, rear-wheel power-steer. 1¼, 1¾ or 2¾-cu. yd. bucket. Gas or diesel engine. Torque converter. Power-shift transmission.

W-10 Terraload'r
6500-lb. capacity, 4-wheel-drive, rear-wheel power-steer. 1¼, 2 or 3½-cu. yd. bucket. 401-cu. in. diesel engine, torque converter, power shift.



W-12 Terraload'r
9000-lb. capacity. 4-wheel-drive, rear-wheel power-steer. 1⅝, 2½ or 3½-cu. yd. bucket. 451-cu. in. diesel engine, torque converter, power shift.

*Gross engine flywheel HP. Sea level (calculated) max. HP (based on 60° F and 29.92" hg.). Mfr's rating.



CUTTING A CANYON — A team of four crawler-mounted drills, made up of three Ingersoll-Rand Crawlmasters and a Joy TM-550, bore 6-in. holes on 10-ft centers for the next to last 22-ft-deep bench to be blasted out of the cut through Jugtown Mountain.

Big Fleet Carves Rock Cuts

IT'S A MAN-MADE CANYON. The big cut through Jugtown Mountain, where hard-working rigs are cutting out nearly 1,500,000 yd of rock, will be 120 ft deep.

Yonkers Contracting Co. of Yonkers, N. Y., holds a $6.3-million contract for building a 4.8-mi section of Route 78 through a rugged chain of hills east of Philipsburg, N. J. The job calls for a total of 3,600,000 yd of excavation—the largest volume of excavation on a single contract in New Jersey history. About 80% of it is rock.

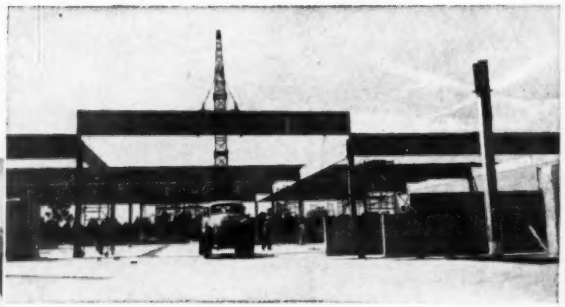
Yonkers carefully selected equipment to handle the work fast and efficiently. And quite a number of the machines are brand new. Owner Edward J. Petrillo spent nearly $6 million in augmenting Yonkers' fleet and replacing worn-out equipment. (Most of the new machines have

continued on page 152

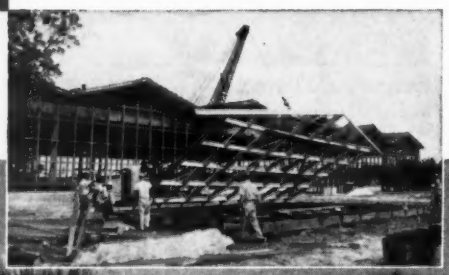
LOADING ROCK — A 5-yd Bucyrus-Erie 88-B shovel working at the center of the face loads International Payhaulers spotted at either side. Average haul distance is 4,000 ft.

Fir plywood components versatile new

Giant prefabricated 4 x 48 foot fir plywood girders were crane-lifted into position atop supporting columns.



Stressed skin fir plywood roof panels were used in pairs to form peaked roofs over 40 foot bays.



Sidewall framing was tilted into position, covered with high density overlaid Exterior fir plywood siding.

ARCHITECTS:
Ralph and William Zimmerman, AIA
Sarasota, Florida

BUILDERS:
Gilbert & Shields Constructors, Inc.
Tampa, Florida

make possible low-cost building techniques

...in 50,890 sq. ft. converting plant for International Paper Co.

One of the largest all-plywood and wood structures built since World War II, this Auburndale, Florida, plant of International Paper Company's Container Division demonstrates the outstanding technological advantage of modern plywood construction. Major key to building economies was the use of prefabricated fir plywood components.

BOX BEAMS, prefabricated of fir plywood, were one time- and money-saver. The beams, strong as steel and far lighter, have webs of 1-inch fir plywood and flanges and stiffeners of 2 x 12's. They were 4′ x 48′, and had a clear span of 40′ to support the series of eight 48-foot peaked roof bays.

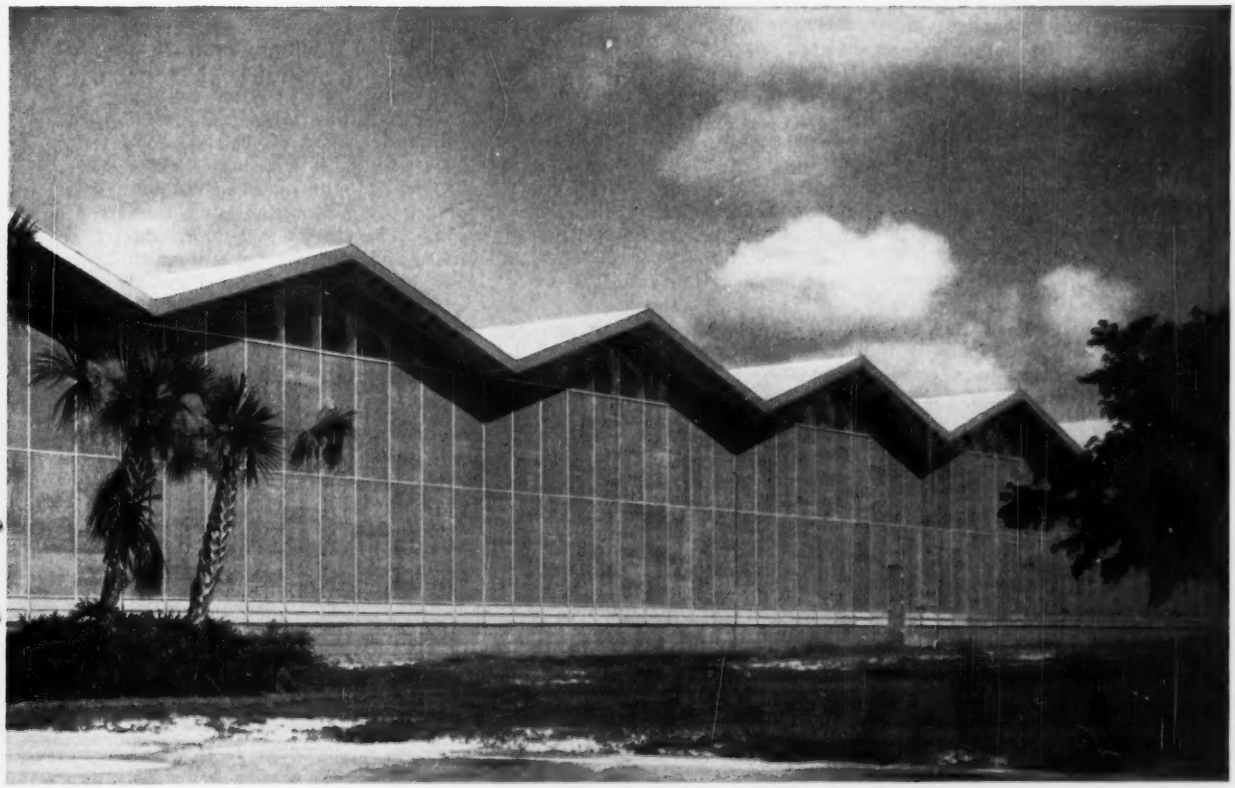
STRESSED SKIN ROOF PANELS, prefabbed with plywood, were lightweight and easy to install. Each pair of panels spans 40′ to form the peaked roof over each bay. Top skin is ⅜″ fir plywood, bottom ¼″, glued and nailed to 2 x 8 framing.

EXTERIOR WALLS are ¾″ high-density overlaid fir plywood which requires no finish and is expected to be maintenance-free for the life of the building. The entire structure was completed in 154 working days. Structural members, including the fir plywood box beams, columns and girders, went up in 10 days. Stressed skin roof panels took 10 days; the siding went on in 5.

FOR INFORMATION on fir plywood component construction or other data, write
DOUGLAS FIR PLYWOOD ASSOCIATION
TACOMA 2, WASHINGTON
—an industry-wide organization devoted to research, promotion and quality control

Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY



FEEDING DRILLS — A bank of six Ingersoll-Rand 600-cfm Gyro-Flo compressors lined up on the bank feed air through 6-in. steel pipe to the drills working below in the cut.

been in service at Jugtown Mountain, but Yonkers' shuttles rigs back and forth between this job and another one nearby.

On the Route 78 job, Yonkers is averaging about 14,000 yd per day. When equipment is working under ideal conditions, they hit a peak production of 20,000 yd a day.

The big Jugtown Mountain cut is at the center of the job. Yonkers started work there about a month after they opened up the job this spring. To complete the 120-ft-deep cut, they have to excavate two more 22-ft-deep benches, containing about 200,000 yd.

Drills Team Up

A team of three Ingersoll-Rand Crawlmasters, new models with 4½-in. drifters, and a Joy TM 550 track-mounted drill bore 6-in. holes in a 10 to 11-ft square pattern. Three Crawl-IR crawler-mounted drills, each supplied with air by a companion compressor, take care of smaller holes along the sides of the cut where shots are kept light to prevent overbreak. Bits are Timken tungsten carbide inserts on Gardner-Denver carburized drill steel.

The smaller rigs also work along a 400-ft section above a railroad tunnel that crosses under the main line of the highway. Final grade comes within 200 ft of the roof of the tunnel. Seismographic recordings show the intensity of the blast vibrations in the tunnel. Working carefully, the blasting crew has cut down to within 25 ft of highway grade over the tunnel without causing any damage.

Supplying air to the four large drills is a bank of six Ingersoll-Rand 600-cfm Gyro-Flo compressors set up in a row at the top of the cut. They feed air to a 30-ft-long section of 6-in. spiral-weld pipe that serves as a receiver tank. A valve at the end of this section regulates the flow of air to a feeder line, which runs for several hundred feet along a berm about 25 ft below the top of the cut.

Valves are spaced at regular intervals in the feeder line. From a valve, a terminal section runs down the steep slope of the cut and ends on the level floor, near the drills. Here another valve feeds the hoses connected to the drills. Altogether the contractor has more than 600 ft of the steel pipe sections on hand. The multiple valving in the feeder line cuts down the number of moves needed to keep the compressor bank within reach of the drills.

Yonkers' powder crew loads from 60 to 80 holes for a single shot, packing about 20 lb each of DuPont 50% ammonia dynamite and Hicap No. 1 on top of a delay at the bottom. They shoot as often as twice a day, and pull about 6,000 yd per shot.

The rock is a combination of shale and hard quartzitic gneiss, commonly called sugar quartz. Fragmentation is usually good, but unexpected changes in rock formation sometimes result in over-size chunks that require secondary blasting. The masts of the big crawler-mounted rigs readily tilt at an angle to drill the larger fragments.

Shovels Load Rock

Loading the blasted rock at the working face of the cut are two shovels, a 5-yd Bucyrus-Erie and a 2½-yd Northwest. The larger shovel works at the center of the face, with trucks spotted on either side; the smaller rig cleans up along the sides of the cut. Another 2½-yd Northwest shovel cleans up the shattered rock blasted out above the railroad tunnel.

A fleet of 15 International Payhaulers, all with new model NRTO 335-hp Cummins engines, hauls rock to a large fill beyond the western end of the cut. This 107-ft-high fill will take 1,700,000 yd—all the material cut out of Jugtown Mountain and then some. The trucks end-dump the rock, and a dozer spreads it in 5-ft lifts. Average haul distance is about 4,000 ft.

PUSH-LOADING SCRAPERS — One of 10 on the job, an International TD-24 helps a Euclid S-18 scraper get a heaping load of clay in a 1,100,000-yd cut at eastern end of job.

SHAPING SLOPES — Yonkers makes a policy of keeping side slopes in shape right from the start. An International TD-24 shapes slopes while scrapers work in cut.

Another cut, through Five Mile Hill, contains 400,000 yd of rock. Yonkers started there when they first began the job in March, but have since pulled out with it about half complete because construction of a bridge cut off access to part of the fill area.

In all there are five cuts. Only one did not contain an appreciable amount of rock. A pleasant change of pace, they did the work entirely with scrapers. At one time seven worked in this cut.

But another cut, rivaling the Jugtown Mountain cut in size, contains 1,100,000 yd, about 65% rock and 35% clay. Both shovels and scrapers are working in this excavation.

A 5-yd Bucyrus-Erie and a 2½-yd Northwest load a fleet of 10 Euclid rear dumps with blasted rock. Four Ingersoll-Rand Crawl-IR track-mounted rigs fed with air by three Ingersoll-Rand 600-cfm compressors handle the drilling. The trucks haul an average distance of 4,000 ft to a 600,000-yd fill at the foot of Jugtown Mountain.

Scrapers Cut Clay

A spread of three Euclid S-18 scrapers push-loaded by an International TD-24 is making the first dent in the portion of the cut containing clayey soil. But Yonkers is bringing in a Euclid loader and a fleet of 10 bottom dumps to move out the bulk of this material. Some of it is reserved for an uncompleted fill at the other end of the job. This job-long haul will be put off until Yonkers winds up the job next summer.

One thing that isn't being left for the last minute is shaping of slopes. While the scrapers work in the cut below, an International TD-24, one of 10 on the job, climbs up and down the sloping sides, getting them in shape.

Project Manager Arthur E. Allison is in charge of the Route 78 project. Floyd Hilton is superintendent at the site; William Colvard heads the blasting crew. Project engineer is Al Pottle. Office manager is George Bshera.

continued on page 156

miller

FIVE IN ONE

FIREBALL

Other Miller welders in this series include:

DA-300-L BIG RIG
Four-in-One:
AC arc welder; DC arc welder; 10 KW AC power plant; 1 KW DC while welding

D-250-L ROUSTABOUT
Three-in-One:
DC arc welder; 10 KW AC power plant; 1 KW DC while welding

D-250-W ROUGHNECK
Two-in-One:
DC arc welder; 1 KW DC while welding

Here's what makes this Miller model the "Five-in-One":
1. AC welder for metallic arc welding
2. DC welder for metallic arc welding
3. AC or DC welder for TIG welding
4. A 10 KW, 115/230v single phase 60 cycle power plant
5. 1 KW of DC while welding

The DAH-350-L Fireball, driven by Hercules 32 hp engine, is another Miller FIRST, offers both a-c and d-c for metallic arc or TIG welding with three separate a-c and d-c amperage ranges for each.

There's continuous high frequency for a-c TIG welding with choice of "start only" or constant high frequency for d-c TIG work.

Standard equipment includes built-in high frequency stabilizer, polarity switch, power supply for water coolant system, and automatic inert gas control panel with solenoid valve and post flow timer. Trailers are available for welder only or for welder with coolant system and gas cylinders.

SPECIFICATIONS

	Metallic Arc	Tungsten Arc
WELDING RANGE	35-100 Amps AC	35- 75 Amps AC
	65-160 Amps AC	65-160 Amps AC
	110-400 Amps AC	150-375 Amps AC
	35- 80 Amps DC	35-100 Amps DC
	75-175 Amps DC	85-225 Amps DC
	125-350 Amps DC	170-375 Amps DC
RATED OUTPUT	250 Amps Tungsten Arc, 100% Duty Cycle DC	
	300 Amps Tungsten Arc, 100% Duty Cycle AC	
CURRENT ADJUSTMENT STEPS	Infinite	
MAXIMUM O.C.V.	72 Volts DC	
	80 Volts AC	
1 KW DC AUXILIARY POWER	115 Volts	
AC GENERATOR OUTPUT	10 KW	
OUTPUT VOLTAGE	115/230 Volt, 1 Phase, 60 Cycle	

Complete specifications on these welders will be sent promptly upon request.

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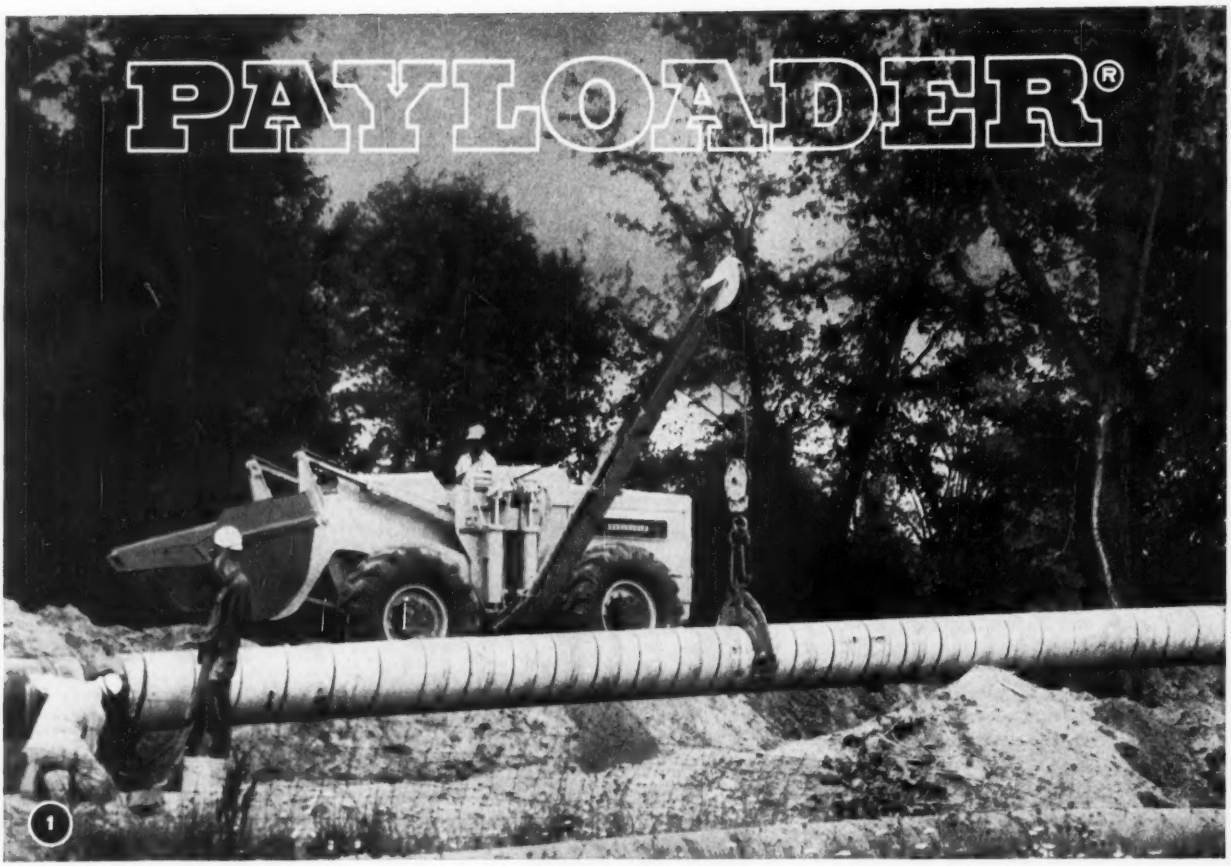
PAYLOADER®
1

2

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4

5

MORE THAN A TRACTOR SHOVEL

No other tractor-shovel comes close to matching the all-around usefulness of a 4-wheel-drive "PAYLOADER" because it has the most complete selection of interchangeable attachments available, including several that are "exclusives" on "PAYLOADER" machines! These are *real working tools* that save time on-the-job and the high cost of single purpose machines:

1 SIDE-BOOM

Superior-Hough hydraulic boom lifts 5-tons, telescopes 10 to 16-ft. Does not interfere with bucket use.

2 HYDRAULIC BACK-HOE

Built exclusively for "PAYLOADER" by Wain-Roy. 190° working radius permits right angle dig and dump. Mounts front or rear.

3 FORK-LIFT

Forks adjust to fit varied size pallets or loose loads of lumber, sheeting, pipe, logs. Easily interchangeable with bucket.

4 ROTARY SNOW PLOW

Built by Ram for "PAYLOADER" tractor-shovels. Separate power unit drive. "V" and blade plows available also.

5 LEAF LOADER

Another "PAYLOADER" exclusive by Ram. Individual hydraulic motors power reel and conveyors. Picks-up 90% of bulk.

6 VIBRATORY COMPACTOR

Jackson vibrators efficiently develop specified densities in all granular soils. Electric motors on each of four 30-in shoes.

7 BLACKTOP SPREADER

Exclusive Ram unit has separate power unit. Lays up to 8-ft. wide, adjusts 0 to 48-in., 0 to 6-in. deep. 2-cu. yd. hopper.

8 "FOUR-IN-ONE" BUCKET

Patented Drott bucket is a "PAYLOADER" exclusive on rubber. Does many shovel, clamshell, scraper and bulldozer jobs.

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LIBERTYVILLE, ILLINOIS
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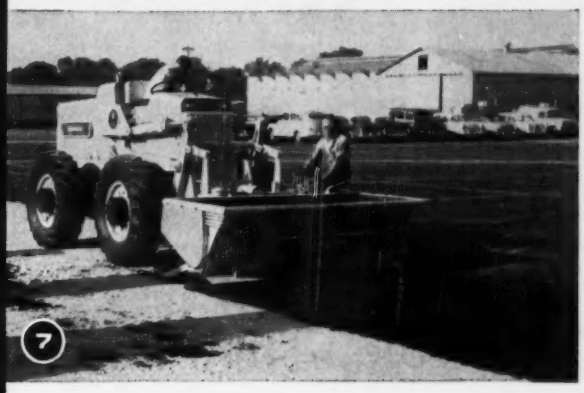

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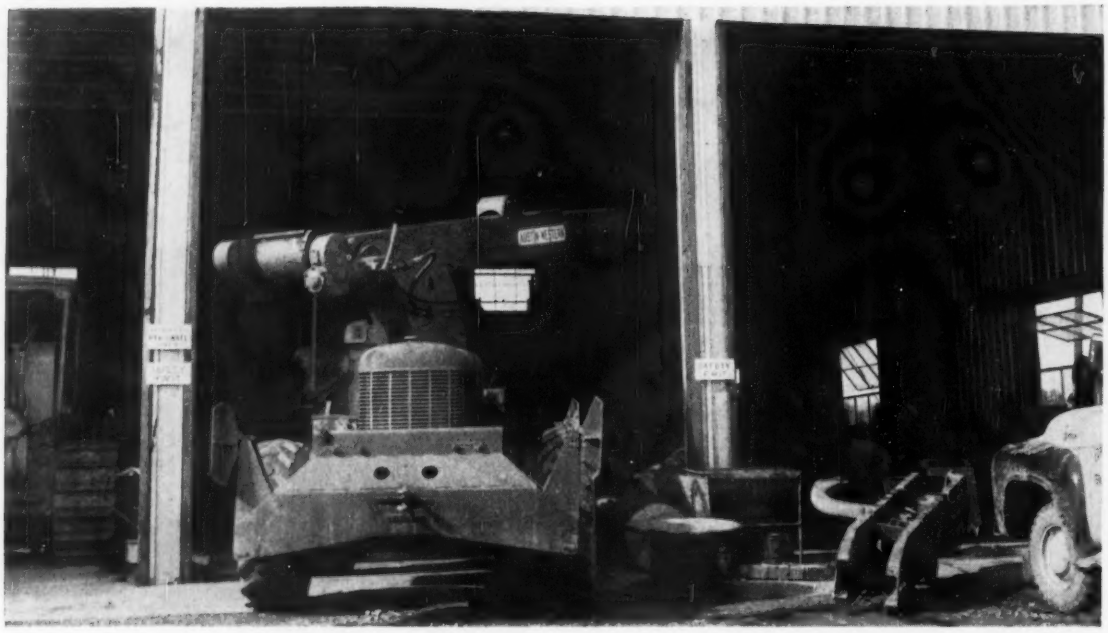


THE HUB — A 50x80-ft Armco prefabricated steel building is the field shop of the maintenance crew. Monorails with 4-ton hoists over side bays provide some muscle, but an Austin-Western hydraulic crane takes time out from duty in yard to lend a hand.

They Keep Their Equipment as Good as New

TO PROTECT their substantial investment in equipment, Yonkers has set up a comprehensive field maintenance program at Jugtown Mountain on their Route 78 project.

It's evident everywhere on the job. Each rig is clean; it's routine on this job to touch up all scrapes and rust spots with paint. A team of mobile mechanics tours the job in pickup trucks to keep a constant check on each rig.

The headquarters for the men who implement Yonkers' maintenance program is a well-planned, well-equipped shop located near the center of the job on top of Jugtown Mountain. A dirt road runs from it to the working site.

Prefab Shop Building

The shop is housed in a 50x80-ft Armco prefabricated steel building containing three bays, each with an overhead door. Minimum headroom is 18 ft. In the center bay it's about 25 ft, enough to accomodate all rigs except the big shovels. An American monorail equipped with a 4-ton hoist over each side bay moves heavy assemblies.

Charley Pontano is the master mechanic who makes Yonkers' ideas on maintenance effective. With more than 30 years experience working on all types of heavy construction equipment behind him, he's well qualified to guide the 10-man maintenance team on this job.

Regular Checks

"Here's what we do," Charley says. "We pull rigs into the shop after 500 hr operation, or sooner if they need major repair, and give them a thorough going-over. We pull the wheels and check brake linings and bearings. While the wheels are off, we change the planetary gears. We check the rear end, torque converter, and engine. Anything that needs attention we take care of right here, from tightening a bolt to an engine overhaul. We order parts directly from the manufacturer's distributor instead of keeping a large stock on hand. We get them plenty fast.

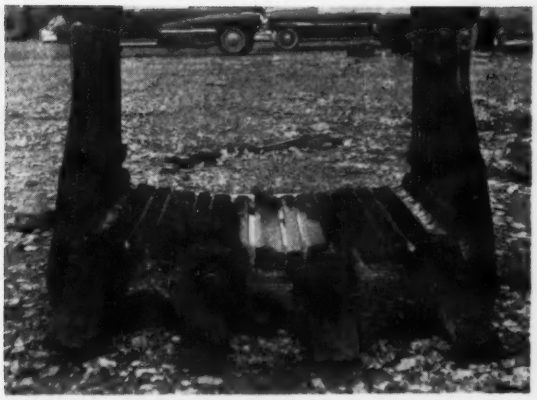
"We try to catch things before they develop too far and cause trouble. Take that tractor over there," Charley points to the center bay, "While checking the track assembly — rollers, idlers, and bearings—we found the roller seals were leaking a little oil. So we're replacing them now. We caught it in time before any serious damage to the bearings and rollers occurred.

"If a job will take more than 2 or 3 hr we bring the rig into the shop. We're usually working on at least three at a time here. But we try to take care of most things day by day in the field. Three of the mechanics patrol the job in pick-up trucks, covering each rig at work in the field once a day.

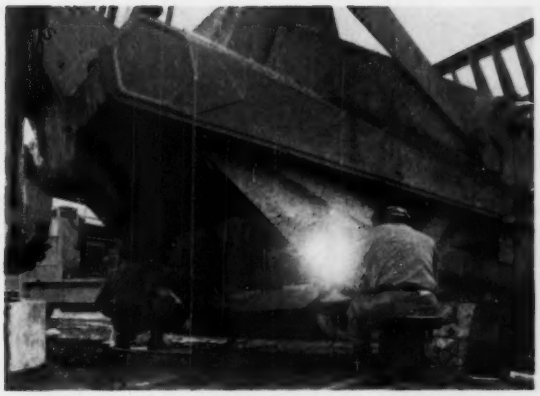
"These roving mechanics clean air filters, check fan belts and batteries, look for leaks and cracks. They're equipped with tools to handle all but major repairs. One truck with a generator and welding unit is on hand to hardface cutting edges.

"We also have a lube truck that travels around the job bringing grease and oil to each rig and a 2,500-gal fuel truck. Texaco supplies our gas, oil, and grease. We've also got an Austin-Western hydraulic crane to handle heavy lifting jobs in the yard.

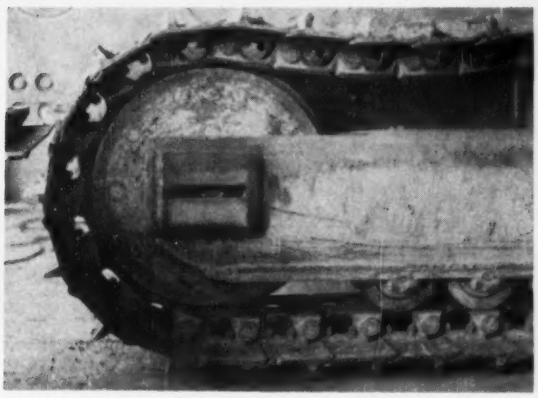
"We handle our new equip-



BUCKET — Strips of manganese steel welded to the inside of a bucket extend the time between overhauls as much as three months.



SCRAPER — Wear plates welded to the bottom of the apron of a Euclid S-18 prevent the cutting edges from wearing loose.



ROLLER FRAME — Steel plate prevents rocks jammed between frame and blade arm from denting frame and obstucting idler.

RADIATOR SHROUD — Steel plate beefs up bottom of radiator shroud on TD-24 and protects radiator from damage by rocks.

ment with kid gloves, breaking in each rig according to the manufacturer's recommendations. We change engine oil after the first 50 hr of operation, check the head bolts with a torque wrench after 100 hr. Each rig is fitted with an hour meter that records operating time.

"And we try to keep the rigs looking like new as well as operating in top condition. Wherever a crack develops, we cut out the metal with a torch all the way down to the root of the crack, and then build weld material in the gouged out groove. That's the only way to really fix a crack. Then we weld a steel plate over the cracked area to reinforce it.

"We reinforce places where dents develop because of particularly hard wear. Like here on the roller carriage of this dozer," Charley says, squatting down beside an International TD-24, "Rocks sometimes jam here between the roller frame and the blade arm. If the roller frame is dented inward far enough, it starts to interfere with free rotation of the idler. So we weld this heavy ½-in.-thick steel plate over the frame to strengthen it.

Welders Keep Busy

"Our four welders are kept busy 10-hr a day with other modifications designed to strengthen our rigs and lengthen their useful life. Those two men working on that Euclid S-18 are welding wear plates to the bottom sides of the apron so that the bolts holding the cutting edges won't wear loose. On the bottom of the bowl we weld strips of ¾-in.-thick manganese steel spaced at about 3 in. to beef it up for the beating it takes grinding and scraping over rocks.

"Another place we use these manganese steel reinforcing bars is on shovel buckets. They increase the life between overhauls as much as three months. And on a job like this with lots of rock to load, that's a big item.

"You've got to keep after it, that's the big thing with maintenance. All the little things you do, day after day, to keep each piece of equipment in shape add up to a big saving in the long run. After all, a contractor is only as good as his equipment, and my job is to keep that equipment in top shape. It's simply a matter of protecting your investment.

"We've got the setup on this job to do just that. Our mechanics are well-trained and resourceful. And the operators help a lot. They develop a personal interest in their rigs and come in to tell us when something seems to be going wrong. It's a team effort—everybody on this job does his share in the maintenance program."

MORE OWNERS IN MORE BUYING MORE MARIONS
OUTPUT AND PROFIT GO UP GO DOWN WITH A MARION

CALIFORNIA — Model 111-M 4½-yd. shovel excavating at Castaic dam site.

MONTANA — A model 12-M ¾ yd. shovel loads shot rock in talc mine.

MINNESOTA — Model 43-M pile-driving with 3,000-lb. hammer on sewer projects.

TEXAS — A 25-ton, 35-M truck crane, with 75′ boom and jib combination, removes cement forms on 1¾ mile long bridge.

INDIANA — One of two 43-Ms working on a 6-mile by-pass near Indianapolis, this dragline carries a special bucket on 50′ of boom.

PLACES ARE BECAUSE AND COSTS ON THE JOB

FLORIDA — With a 2-yd. dragline bucket on 60' of boom, this Model 362 is dredging at major residential site.

OHIO — Model 43-M 1-yd. backhoe working on sewer project.

TODAY'S MARIONS GIVE YOU MORE IN SUSTAINED, LOW-COST PERFORMANCE

MACHINE	Shovel Capacity	AVAILABLE AS				
		Hoe	Crawler Crane	Truck Crane	Wagon Crane	Special Crane
35-M	¾	Yes	Yes	Yes	Yes	—
37-M	—	—	—	Yes	Yes	—
43-M	1	Yes	Yes	Yes	Yes	—
362	1½	Yes	Yes	—	Yes	Yes
93-M	2½	Yes	Yes	—	—	Yes
101-M	3	—	Yes	—	—	—
111-M	4	—	Yes	—	—	—

ALABAMA—Model 93-M recovers iron ore. It carries a 2-yd. bucket on 60' of boom.

CONNECTICUT — Killingley Thruway is helped along by this 101-M 3-yd. shovel.

NEW JERSEY — $6-million high school construction job handled by Model 35-M, ¾-yd. backhoe.

MARION POWER SHOVEL CO., MARION, OHIO

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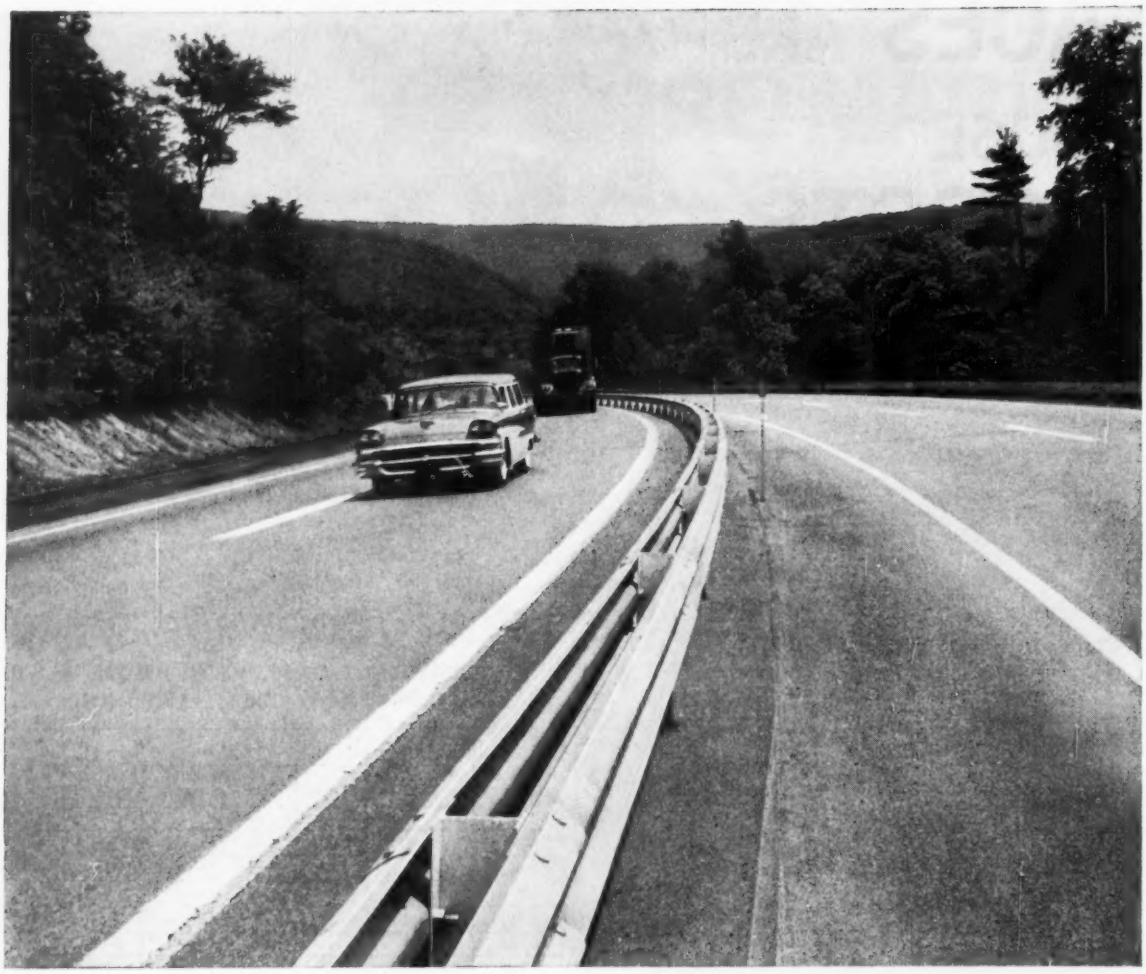

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When you specify Bethlehem galvanized beam guard rail, you can count on these advantages:

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5. Galvanized rail will last as long as any competitive material, at lower cost, and at no sacrifice in strength.

For full details, call our nearest district sales office. They'll be glad to give you the full story on Bethlehem galvanized beam guard rail.

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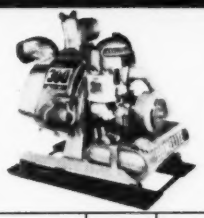
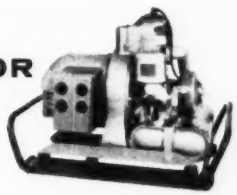


Size	Capacity	Wt. in lbs.	Model
	CENTRIFUGAL PUMPS		
1½″	5,500 g.p.h.	45	20S1½
2″	10,000 g.p.h. (slow speed)	69	35S2-1
2″	10,000 g.p.h.	69	35S2-1R
3″	18,000 g.p.h. (slow speed)	103	8S3-1
3″	18,000 g.p.h.	103	8S3-1R
3″	102 g.p.m. at 60 p.s.i. 250 g.p.m. — open discharge	103	8S3-1P
	DIAPHRAGM PUMP		
3″	5,000 g.p.h.	120	20DP3

HOMELITE HAS A CARRYABLE GENERATOR FOR EVERY JOB



Capacity (Watts)	Current	Wt. in lbs.	Model
1,500	115 volt, 60 cycle, AC	90	35A115
3,000	115 volt, 60 cycle, AC	140	8A115
3,000	115/230 volt, 60 cycle, AC	141	8A115/230
3,000	115 volt, 60 cycle, AC	170	41A115
3,000	115/230 volt, 60 cycle, AC	171	41A115/230
3,000	230 volt, 180 cycle, 3-phase AC plus 110 volt DC	143	8HY

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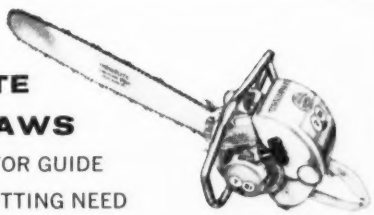
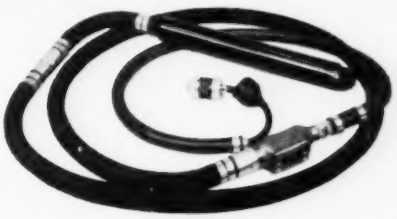


	ZIP	WIZ	7-19C	7-21C	9-23	9-26
Wt. in lbs. (Engine Only)	20	20	19	21	23	26
Type of Drive	Direct	Gear	Direct	Gear	Direct	Gear
Tree Sizes Model Will Cut (Dia.)	Up to 3′	Up to 5′	Up to 5′	Up to 7′	Up to 7′	Up to 10′
Straight Blade Bar Lengths	12″ to 21″	14″ to 28″	12″ to 30″	14″ to 60″	17″ to 44″	18″ to 60″

HOMELITE ONE-MAN CONCRETE VIBRATORS



Type	Head Dia.	Motor	Wt. (Complete)	Model
Motor-in-head	2.3″	High-Cycle*	47 lbs.	VH-LD
Motor-in-head	2½″	High-Cycle*	41 lbs.	VH-10
Motor-in-head	4″	High-Cycle*	58 lbs.	VH-HD
Motor-in-head	2¾″	110 v. AC-DC	42	VU-MH
Flexible Shaft	1¼″ & 1⅞″	110 v. AC-DC	41	MU-FS

ELECTRIC TOOLS

BUILDER'S HAMMERS

Weight	Capacity (Drill Sizes)	Motor	Model
13 lbs.	¼″ to 1⅛″	115 volt AC-DC	BH-13-U
21 lbs.	½″ to 2⅜″	115 volt AC-DC	BH-21-U
20 lbs.	½″ to 2⅜″	High-Cycle*	BH-HC

PAVING BREAKER

Does all jobs that a 40-45 lb. air hammer will do. High-cycle motor. Weight: 60 lbs.

Light-duty model also available. Weight: 64 lbs.

ROCK DRILL

Drills holes up to 2″ in diameter, up to 20′ deep. High-cycle motor. Weight: 65 lbs.

A complete line of accessories and tools are available from Homelite for the above builder's hammers, paving breakers, and rock drill.

*180 cycle, 230 volt, 3-phase AC power for high-cycle tools is supplied by carryable Homelite generator, Model 8HY.

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Ohio contractor sets earth-moving record of 100,000 yards

GULF MAKES THINGS

When you have scrapers big enough to handle 50 yards heaped . . . and you keep them rolling at more than 95% availability every working day . . . you can build quite a reputation as a big-league earth mover.

That's the story at C. F. Replogle, Circleville, Ohio. With king-sized MRS scrapers and other heavy equipment—all serviced with Gulf fuels and lubricants—their company earth-moving record is over 100,000 yards a day.

One of Replogle's recent big projects was a 3-mile section of the Cincinnati-Conneaut Thruway near Belleville-Mansfield, Ohio. The contract called for moving some 2,000,000 yards of earth, paving, and constructing 11 bridges. They've already completed the earth-moving, on schedule, in spite of weather delays. According to Charles Thompson, Operations Manager, Gulf fuels, lubricants and on-the-job service had a great deal to do with the fast pace of the entire operation.

"We know our engines run clean on Gulf diesel fuel, because we have no injector or pump trouble," says Mr. Thompson. "This pays off in equipment availability. Our equipment is available over 95% of the time."

Dean Shellhouse, Superintendent of Maintenance for

Gulf man on-the-job checks fuel and lubricant requirements at Replogle project on 3-mile section of Cincinnati-Conneaut Thruway. At right is Robert Williams, Gulf Sales Engineer with Charles Thompson, Operations Manager of C. F. Replogle Construction Company.

a day using Gulf fuels and lubricants...

RUN BETTER!

Replogle, adds: "We use over 3,000,000 gallons of Gulf diesel fuel a year, and have no problems with gum, sludge or sulfur deposits. A first line fuel is not expensive when you consider freedom from breakdowns and resulting costs."

Replogle also uses Gulf Super Duty Motor Oil, Gulflex A grease, Gulf Multi-Purpose Gear Lubricant, Gulf Harmony oil for compressors and Good Gulf gasoline.

On your next project, see how Gulf makes things run better! Call your nearest Gulf office, or send for 88-page "Gulf Contractors' Guide."

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GULF OIL CORPORATION
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ACCESSORIES

BUILDING AND ROAD SPECIALTIES

SPIROLOC Form Ties

SPIROLOC Cone Nut Assembly

The most positive internal spreader and form tie

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TWISTYES

Combination wedge and bearing plate . . . easy application . . . won't twist or fall off — ample take-up.

SNAP TIES

Curved ends speed installation and stripping . . . long slope wedge for ample take-up. Extra nail holes permit nailing clamp in any position.

Low cost ties for job-built or prefabricated forms. Used with or without walers. Accurate breakbacks. Choice of spreader washer.

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"Sure-Grip" principle means positive locking SAFE . . . SURE Tieing

2 Form clamps and a mild steel rod make a tie to handle any condition.
Wide clamp base gives more bearing on waler . . . won't "bite" at maximum loads.
Notched base permits nailing to waler.

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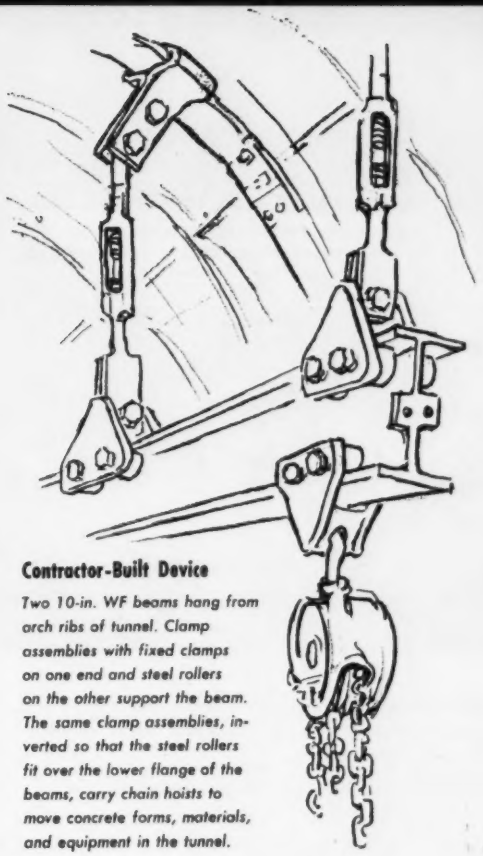


Contractor-Built Device

Two 10-in. WF beams hang from arch ribs of tunnel. Clamp assemblies with fixed clamps on one end and steel rollers on the other support the beam. The same clamp assemblies, inverted so that the steel rollers fit over the lower flange of the beams, carry chain hoists to move concrete forms, materials, and equipment in the tunnel.

Overhead Trolleys Handle Concrete Forms in Tunnel

AN OVERHEAD TROLLEY that rolls along the lower flange of a steel beam handles concrete forms inside the Piney Branch Storm Sewer in Washington, D.C.

The contractor-built device is easy to install and to move forward as tunneling progresses. It was developed by Herman Boyer, project manager for Underground Construction Co., the joint-venture contractor on the $5-million job.

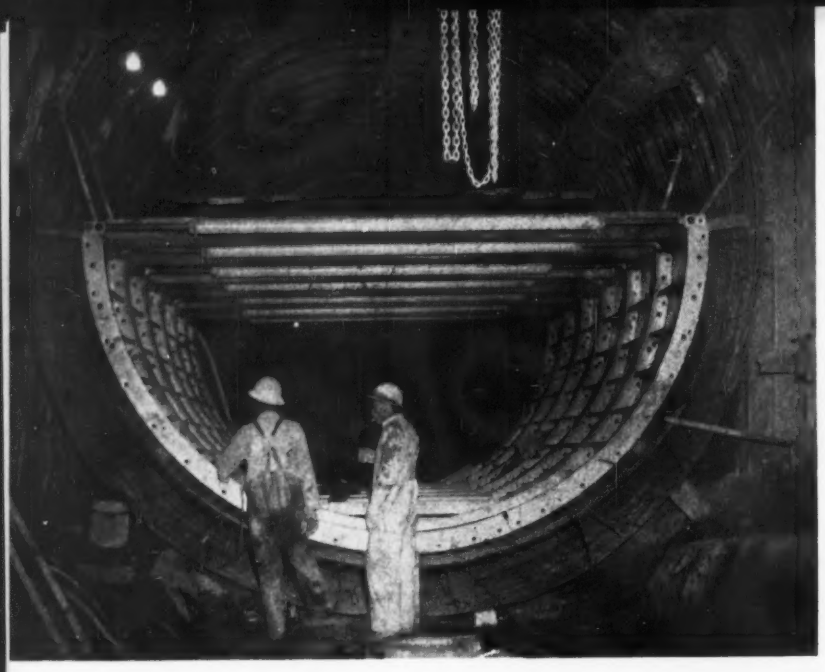
The construction firm suspended a 10-in. WF beam 240 ft long from the arch ribs in the tunnel bore with a series of clamp assemblies made on the job. Each clamp assembly has a fixed clamp at one end and 2-in. steel rollers at the other end.

As the first step in erecting the overhead system, workmen secure the fixed clamp over the flange of a tunnel rib. Then they slip the rollers under the top flange of the beam. Clamp assemblies secured in this way about every 14 ft support the entire length of the beam.

This same type of clamp assembly, inverted, supports the trolley. First, they place the roller end of the assembly over the bottom flange of the beam. Then they hang a 3-ton electric chain hoist from the fixed clamp. In this way, the lower flange of the beam serves as a monorail.

With this suspension system,

MUCKING—Workmen with shovels remove mica schist from top heading. First they break up top third of rock face with Cleveland H-52 air hammers. Then they dynamite bench.

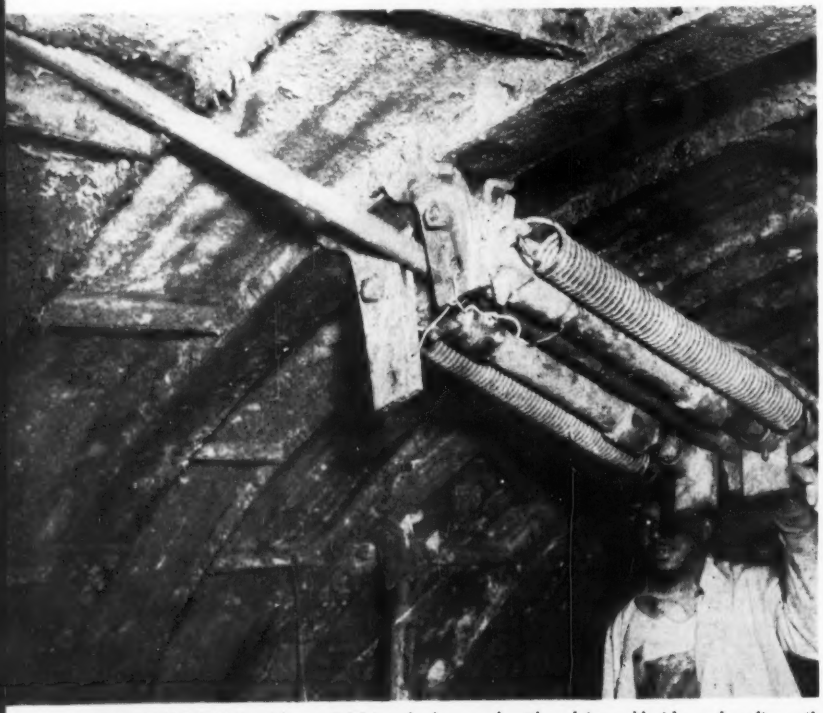


INVERT FORMS—Disintegrating mica requires pouring concrete close behind working face to help support arch ribs. Overhead trolley advances forms along tunnel invert.

OVERHEAD TROLLEYS . . . *continued*

workmen can roll the beam ahead with ease toward the working face. All they have to do is transfer from one end of the beam to the other end the clamp assemblies that hang from the ribs.

For convenience, the contractor suspended two parallel monorail beams, hanging three trolleys from each beam. In addition to handling forms, this overhead system relocates rail switches for the muck cars and even moves material that the muck cars can't carry.



INJECTION RIG—After solidifying bad ground with calcium chloride and sodium silicate, injection pipe is withdrawn by two hydraulic jacks. Springs retrack jacks' rams.

Tunneling

Underground Construction is excavating 4,600 ft of 20-ft modified horseshoe. Because they are working in a densely populated section of the city, they must comply with a city regulation that prohibits blasting, drilling, and mucking after 7 pm and work of any kind after 11 pm. For this reason, the contractor excavates during the day and pours concrete at night.

Tunneling takes place 50 to 100 ft below ground surface. Except in three areas, the bore goes through a mica schist that disintegrates rapidly upon contact with air. In the three other areas, the contractor encountered a total of 300 lineal ft of sand, gravel, and boulders.

To tunnel through this loose material, Underground called in Chemical Soil Solidification Co., of Chicago, to "freeze" it with a mixture of sodium silicate and calcium chloride. This turns it into a sort of sandstone. Here again the overhead beam comes in handy; it supports Gardner-Denver grout pumps that inject the chemicals under pressure. Workmen can tunnel through the solidified strata several hours after injection.

Tunneling proceeds by the top heading and bench method in two headings turned from either side of the main shaft. Workmen excavate the top heading, about one-third of the face, with Cleveland H-52 air hammers.

As close behind the working face as possible, they set 6-in. WF arch ribs on 2-ft 8-in. centers, lagged with 3/16 in. liner plates. Needle beams support the ribs while they prepare to blast out the rock bench. The contractor avoided delays from the steel strike by stockpiling ribs and liner plates fabricated by Commercial Shearing and Stamping Co. ahead of time.

Cleveland pneumatic jackleg drills with 1-in. steel make 12 to 15 blast holes in the bench, depending upon rock conditions. Light charges of dynamite remove 3 ft of rock face per shot. Breakage is reasonably uniform, in small chunks.

At each face, an Eimco air-powered 630 loader fills muck cars. After clearing away the

muck, the crew rounds off the tunnel invert with air hammers. They remove the needle beams and extend the ribs down to the invert. The driven tunnel has the form of a horseshoe arch with a rounded invert.

To cope with the disintegrating mica, Underground pours concrete 90 ft behind the working face to provide firm support for the ribs. The trolleys position the invert forms. Concrete is placed with Pressweld pneumatic machines and vibrated into place.

They complete the top portion of the arch with Blaw-Knox traveling forms. Later they will cover the invert with vitreous brick. The finished circular sewer tunnel measures 14 ft 6 in. in dia.

Muck Removal

All equipment and the 100-man crew enter and leave the tunnel from a single shaft, 100 ft deep and 38 ft in dia, sunk near the center of the job in a street traffic circle. On street level, there is only an acre of storage space.

A Mayo 10-ton capacity elevator operates in the shaft. Men, materials, and equipment are raised and lowered in a 7x16-ft cage with tracks on the floor.

A 6-yd muck skip is mounted under the cage. It descends into a 17-ft deep pit below the cage landing, and the muck cars side dump their loads into it. The skip raises about 300 yd of muck a day and dumps it into 10-yd Mack trucks for haulage to disposal areas about 4 mi away.

The tunnel has encountered no underground streams, but workmen have had to contend with a considerable amount of ground water. Three Gardner-Denver 6-in. pumps remove 20,000 gph.

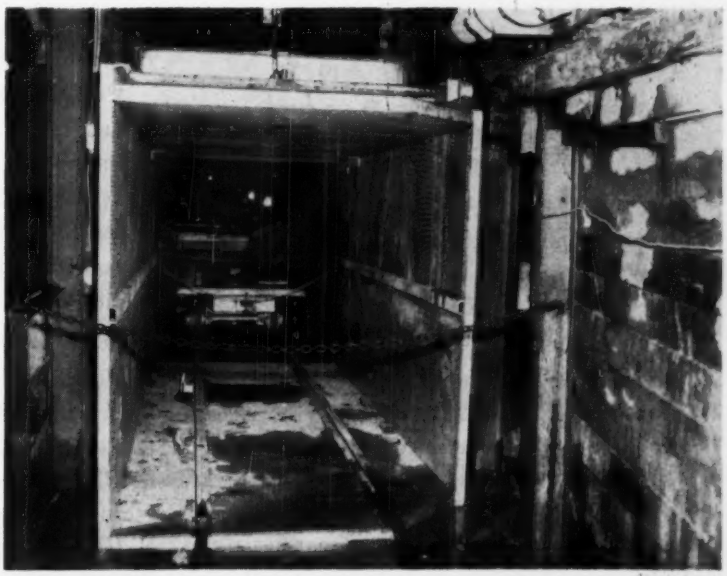
A powerhouse at street level contains auxiliary power equipment and repair facilities for four battery-powered locomotives and other equipment. For battery recharge, locomotives are raised in the cage, run onto surface tracks and into the repair shop.

Two Chicago Pneumatic 1,500-cfm compressors supply air for ventilation and air tools.

Men on the job

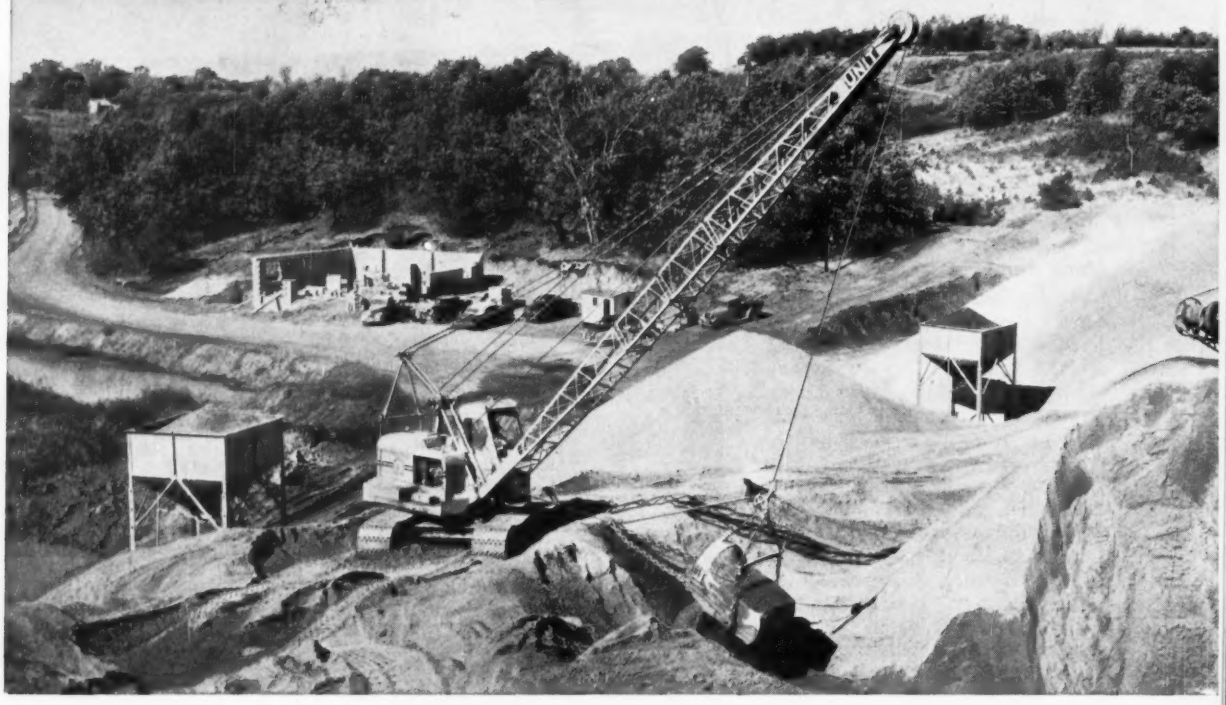
The project is being built for the District of Columbia Department of Sanitary Engineering. George M. Dick serves as project engineer for the district government. John Fisher is superintendent for the contractor.

MAIN SHAFT—All men and equipment enter tunnel in Mayo 10-ton capacity elevator that operates in main shaft. Skip, mounted under cage, raises 300 yd of muck a day.



CAGE LANDING—Cage with tracks can raise battery-powered locomotives to surface. Muck, from two faces at either side of main shaft, is dumped into 6-yd skip under cage.

PUT THE EARNING POWER OF A UNIT ON YOUR JOBS!



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No other machines in their class perform like a UNIT, because none are built like a UNIT. No one else offers you a one-piece cast gear case with all gears, shafts and bearings operating in an oil bath; automatic traction brakes; straight-in-line engine torque converter drive; all disc type operating clutches; the liberal use of drop forged parts; heat treating on all essential components; full vision operator's cab — a combination of features you don't find even on the highest priced machines.

You'll find a UNIT is worth more when you buy it—and worth more when you sell or trade. Before you buy another excavator, compare UNIT—you'll be glad you did. Write for literature on the models shown or see your nearby UNIT distributor.

CRAWLER SHOVELS
5 CONVERTIBLE MODELS

A rugged line of power-packed machines, designed for today's competitive bidding. Fast operating, simple in design and fully convertible for maximum versatility.

Model	Shovel	Hoe	Dragline	Crane	Clamshell
513C	½ Yd.	½ Yd.	½ Yd.	5½ Ton	½ Yd.
614	½ Yd.	½ Yd.	½ Yd.	8 Ton*	½ Yd.
617	⅝ Yd.	⅝ Yd.	⅝ Yd.	10 Ton*	⅝ Yd.
1020	¾ Yd.	¾ Yd.	¾ Yd.	12½ Ton*	¾ Yd.
1220	¾ Yd.	¾ Yd.	¾ Yd.	16 Ton*	¾ Yd.

*Maximum Crane Capacity.

TRUCK CRANES
4 CONVERTIBLE MODELS

Select the size to fit your needs — all with finest engineering and exclusive quality features. Mounted on rugged carriers for dependable performance on the job and between jobs.

Model	Crane	Shovel	Hoe	Dragline	Clamshell
513T	10 Ton	½ Yd.	½ Yd.	½ Yd.	½ Yd.
1014	15 Ton	⅝ Yd.	⅝ Yd.	⅝ Yd.	⅝ Yd.
1520T	20 Ton	¾ Yd.	¾ Yd.	¾ Yd.	¾ Yd.
360T	30-40 Ton	.....	.....	.....	.....

MOBILE CRANES
2 CONVERTIBLE MODELS

Self-propelled, one man controlled and operated, for on or off highway use. Big capacities, short turning radii. Convertible for greater versatility.

Model	Crane	Dragline	Shovel	Hoe	Clamshell
357	15 Ton	½ Yd.	½ Yd.	½ Yd.	½ Yd.
1520	20 Ton	¾ Yd.	.....	.....	¾ Yd.

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Please send complete information on the following

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Name..... Title.....

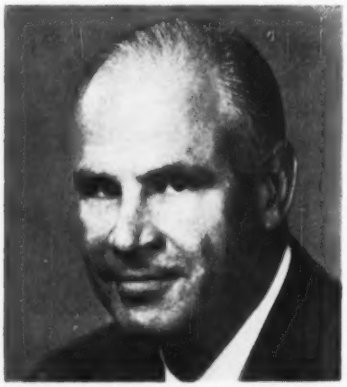
Company.....

Address.....

City..... State.....

Construction Men in the News . . .

Morrison-Knudsen



A. O. STRANDBERG (left) and JOHN L. ARMITAGE are newly elected vice presidents and directors of Morrison-Knudsen Co., Inc., Boise, Ida. Another member of the firm, Joseph P. Frein, chief engineer, is now a director.

Strandberg has been Seattle manager of M-K since 1954. He was project manager for construction of Aluminum Company of Canada's underground power facilities in British Columbia, and he supervised the building of a pumping plant at Grand Coulee Dam. During World War II he supervised construction in the Pacific area for the Corps of Engineers.

Armitage joined M-K in 1929 during the construction of Deadwood Dam in Idaho. Later, he worked on Hoover, Imperial, Shasta, and Norfork Dams. After a stint as shipyard superintendent in World War II, he returned to M-K to direct construction of Santa Cecilia Dam in Brazil, Cresta and Rock Creek Dams in California, Littleton Dam in New Hampshire, and the Eisenhower Lock on the St. Lawrence Seaway.

Frein joined M-K in 1943. He worked on a wide range of projects, including Madden Dam in the Panama Canal Zone and the Canol Pipeline in Alaska.

Brown & Root

HOWARD PAYNE, assistant general manager of construction for Brown & Root, Inc., Houston, Tex., is a new vice president of the firm.

Payne, who has considerable experience with the company's foreign operations, recently returned from an inspection trip of Brown & Root dam projects in Thailand. He was general superintendent of the Artibonite Valley project in Haiti, completed two years ago.

He joined Brown & Root in 1937 during the construction of Marshall Ford Dam near Austin, Tex., where he was assistant superintendent. During World War II he was general superintendent of the Brown Shipbuilding Co. in Houston and general superintendent for the construction of the Galveston Freeway. He also supervised construction of Marble Falls and Granite Shoals Dams on the Colorado River.

Raymond

JAMIE H. KERR, JAMES B. SMITH, and WILLIAM H. MOONEY are new division managers of Raymond Concrete Pile Co., a division of Raymond International, Inc.

Kerr, named manager of the St. Louis office, joined Raymond in 1951 as a field engineer. Later, he served as a superintendent and as assistant district manager in New Orleans.

Smith is now manager in Kansas City. He served in a number of district offices and worked on air base projects in Spain.

Mooney, who joined Raymond in 1941 as a superintendent, becomes manager of the Houston office.

King

P. L. GRIFFITH is a new vice president of James King & Son, Inc., general contractors of New York City. He joins King after 25 yr experience in construction and engineering.

Previously he worked for Kelly & Gruzen, architects and engineers. Before that he was employed by Walter Kidde Constructors, Inc.

Stone & Webster

ROBERT L. ALLSHOUSE is now construction manager for Stone & Webster Engineering Corp. Previously, he was superintendent of construction in Texas and Louisiana for the firm.

Since joining Stone & Webster in 1952, he has worked on industrial and power plant projects. He will transfer from Texas to the Boston headquarters.

Utah

CHARLES E. McGRAW is a new special vice president of Utah Construction & Mining Co. He will serve as assistant manager of the company's construction division.

For the past 4½ yr, McGraw has been vice president and general manager of Marcona Mining Company's operations in Peru. Prior to that, he served 4 yr with Utah's construction division.

Reduce your ACTUAL OIL costs!
60¢ per gal. with 60 hour drain period = 60¢ actual cost.
90¢ per gal. with 180 hour drain period = 30¢ actual cost.
$1.00 per gal. with 240 hour drain period = 25¢ actual cost.
You can save 25% to 50% on engine oil with D-A controlled lubrication by using D-A's accurate laboratory service to determine maximum safe drain periods.

Controlled lubrication means more hours of safe operation for each lubrication dollar. With D-A "Extra-Treated" Diesel Oil you can greatly extend your drain periods . . . up to 400% . . . and save on both oil costs and equipment maintenance. D-A "Extra-Treated" Diesel Oil offers these advantages: high, natural viscosity index for added protection against wear; more and better additives to prevent additive starvation and to hold harmful wastes in suspension; neutralization of acid corrosion even under abnormally severe conditions.

To take advantage of the superiority of D-A "Extra Treated" Diesel Oil, you must *know* how far you may safely lengthen your drain intervals. To do this, D-A's free laboratory analysis is at your service. Ask your local D-A representative for details; he will be glad to show you how you can get the best lubrication for the least cost.

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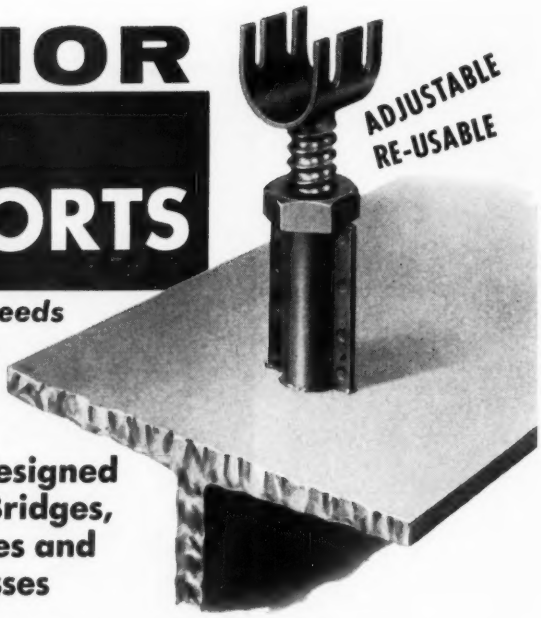
Heavy-Duty SCREED SUPPORTS

Pat. Applied For

For Use with 1¼" and 1½" I.D. Pipe Screeds and Vibratory Screeding Equipment



ADJUSTABLE SCREED HOLDER

Consists of a 1" threaded rod to which is welded a cradle to hold the pipe screed. This cradle is slotted as shown so that the arms may be bent over to secure the 1¼" or 1½" I.D. pipe screed. Threaded onto the rods is a half nut which provides the adjustment.

Especially Designed for Use on Bridges, Underpasses and Overpasses

These Screed Supports are designed to take the heavy loads imposed by traveling vibrating screeding equipment. The Bases for the screed holders are of two types: (1) The Metal Base for use on structural steel members; (2) the Chair-Type Base for use on a plywood deck.

On Structural Steel: As shown above, the Metal Base is tack-welded to the top flange on approximately four foot centers. The Screed Holder is set into the base, and adjusted to height by turning the nut. The threads are fast, three to the inch, and of a contour type, non-clogging and easily cleaned.

On Wood or Plywood Decks: The Chair Base is set on the deck at approximately four foot centers. It is easily secured to the deck by nailing across the upturned legs. If desired, legs can be supplied of galvanized wire. The Chair Base with holder is shown below.

PERFORMANCE

Superior's Heavy-Duty Adjustable Screed Supports have been used on turnpike structures and other projects. Results in the field indicate that this method of supporting screeds provides a simple answer to an otherwise expensive and complicated set up. *Write for Bulletin.*

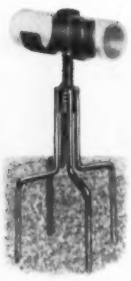
HOLDER INSERTED IN CHAIR BASE

Only the inexpensive bases are left in the concrete. The Adjustable Holders are easily removed, together with the pipe screed, because the holders are set, not screwed into the base. The nut fully covers the base opening and prevents concrete from entering.

Adjustable Standard SUPERIOR SCREED CHAIRS

FOR FORMED SLABS 4½" AND GREATER

With re-usable screed holders using 1" I.D. pipe and rectangular bars for screeds.



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Sales and Service

Equipment purchasing and servicing takes less time when you know who and where to call. Keep advised of new distribution, sales personnel and other activities.

Distributor Appointments

Simplex Forms System, Inc.: Two new distributors have been appointed. Southern Spanall, Inc., of Fort Lauderdale, Fla. will cover Florida, Georgia, and Alabama. Empire Equipment Co. of Buffalo, N.Y., will cover western New York State and northwest Pennsylvania.

Olin Mathieson Chemical Corp.: The Cincinnati Steel Products Co., of Cincinnati, Ohio, has been appointed a distributor for the full line of Olin Aluminum mill products.

Radio Corp. of America: The following manufacturer's representatives for RCA mobile communications equipment have been appointed. Kacy Communications, Inc., of Kansas City, Mo.; Electronic Enterprises, Inc., of St. Louis, Mo.; Memco, Inc. of Memphis, Tenn.; Treece Communications, Inc. of Little Rock, Ark.; Electronic Distributors, Inc. of Muskegon, Mich.

Curtiss-Wright Corp.: The Aztec Equipment Co., Inc., of Phoenix Ariz., has been appointed distributor by the South Bend Division of Curtiss-Wright for its complete line of construction machinery.

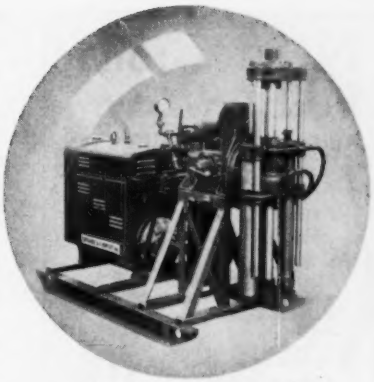
On the Sales Front

The Eimco Corp.: Wayne L. Dowdey, formerly manager of the Southern District, has been appointed general sales manager for the company. Paul O. Richter, Eimco vice president, has been named general manager of the Filter Division. William M. Phillips has been promoted to the post of manager of the Southern District.

Brunner & Lay, Inc.: The following sales representatives have been appointed: H. P. Andrews, Louisiana, Mississippi, and east-

S&H MODEL 30

CORE DRILL MACHINE



• LIGHT
• COMPACT
• PORTABLE
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- The ideal machine for foundation investigation and shallow mineral exploration.
- Available with either screwfeed or hydraulic swivelheads with or without built-in water pump and a wide choice of power units.
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- The Model 30 is a quality machine produced by a quality manufacturer.

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NEW 3/4-ton Pull-A-Way
Added to WRIGHT
TYPE "C" LINE!

FOUR SIZES • ¾, 1½, 3 and 6 Tons

FEATURES
- Lubricated for life
- Hooks are drop-forged
- Special alloy-steel chains
- Chain sheaves of drop-forged alloy steel
- Gear teeth cut to precision limits
- Load brake is dependable and safe
- Weights:
  ¾-ton, 14 lbs.
  1½-ton, 23½ lbs.
  3-ton, 36½ lbs.
  6-ton, 63 lbs.

New 3/4-ton model
• VERSATILE
• LIGHTWEIGHT

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Wright Hoist Division
AMERICAN CHAIN & CABLE
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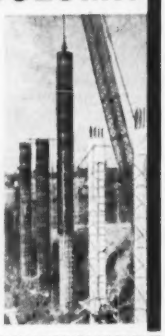
NEW! EFCO
BRIDGE COLUMN FORMS



EFCO Bridge Column Forms used on New Orleans overpass save time and labor. Precision construction permits quick, easy stripping as shown. Adaptable to a wide range of uses. Ideal for forming pier nosings when combined with regular EFCO Forms.

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Please send information on EFCO Bridge Column Forms, and address of nearest sales office.

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Firm name.....
Address.....
City.....State.....

SALES AND SERVICE . . .
continued

ern Texas; J. F. Fitzpatrick, Iowa, North and South Dakota, Minnesota, Nebraska, and Wisconsin; B. E. Hartman, Arkansas and Oklahoma; and Lloyd Martin, West Texas and New Mexico.

Chicago Pneumatic Tool Co.: John Wylder has been appointed manager of the Boston District. He replaces D. H. McSherry who died recently.

In the Main Office

Armco Steel Corp.: Ralph L. Gray, president of the company since 1956, has been elected chairman of the board of directors. Logan T. Johnston will succeed him as president.

Sherman Products, Inc.: Ralph M. La Porte has been elected president of Sherman products to succeed W. A. Romain, who has resigned. Vincent J. Crampton has been elected executive vice president. He also will continue as secretary and treasurer.

Associations

Asphalt Institute: Eugene M. Stone, president of the Empire Petroleum Co., Denver, Colo.; has been elected chairman of the board of the institute. He succeeds Don L. Nielsen of the Union Oil Co. of California. James C. Bunyard has been appointed district engineer in Atlanta, Ga.

Special Mention

Crane Carrier Corp.: Crane Carrier Corp. of Tulsa, Okla., has acquired the Maxi line of self-propelled crane carriers and trucks from Insley Mfg. Corp. and The Maxi Corp., its wholly owned subsidiary. All future sales and service of Maxi products will be conducted by the Crane Carrier Corporation from their Tulsa plant. Insley will continue to offer Maxi self-propelled carrier mountings for their complete line of cranes and excavators.

Koehring Co.: The complete business of Flaherty Mfg. Inc., of Pocatello, Idaho, has been acquired by Koehring. It will operate as a branch of Koehring's Buffalo-Springfield Division. Flaherty manufacturers power brooms, aggregate spreaders, portable crushers, rubber tired rollers, and conveyors.

New Books to Help in Your Work

PRACTICAL PRESTRESSED CONCRETE
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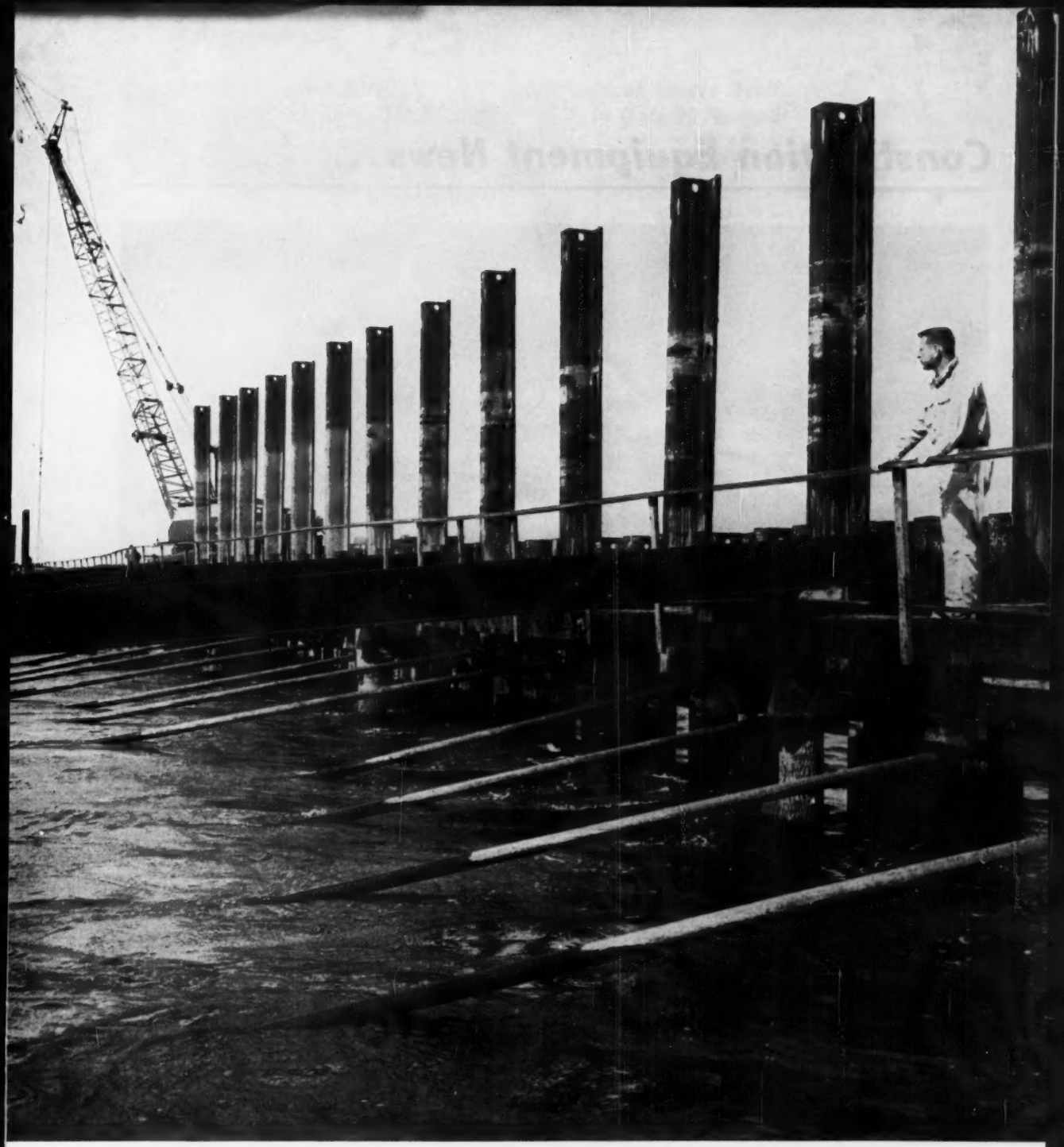

These Bethlehem multiple-unit tie rods are 105 ft long. But Bethlehem supplies multiple-unit tie rods in much greater lengths. Any lengths, to be exact. Cut-thread tie rods, plain or upset, in diameters through 4½ in. Rolled-thread tie rods in diameters through 1½ in. Single-unit tie rods up to 65 ft long. Both multiple- and single-units can be ordered straight or bent, asphaltum-dipped, or hot-dip galvanized. Delivery is fast. Just call or write the nearest Bethlehem office.

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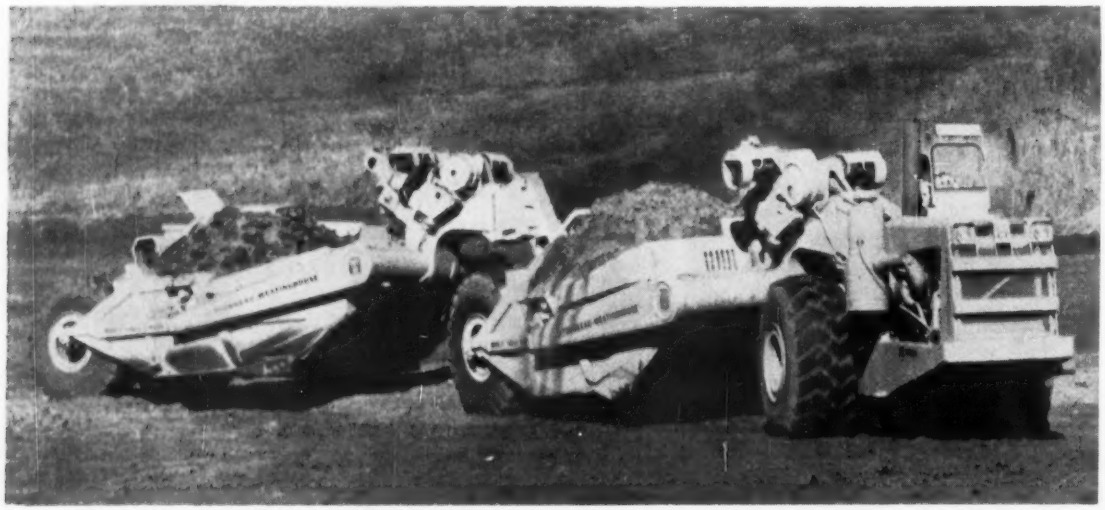
Construction Equipment News...



Tandem Scrapers Offer Tailor-Made Capacity

Owners of LeTourneau-Westinghouse scrapers now can match the capacity of their equipment to the job conditions. Tandem scrapers offer a total of 17 teamings of horsepower and scraper capacity.

Tandems are available behind all three sizes of L-W two-wheel Tournapulls as well as behind the four-wheel Speedpull. Total capacities range from 18 yd to 56 yd.

One set of electric controls for each scraper operates the tailgate, apron, and bowl lift. No long runs of wire rope are necessary. Front axle and wheels have been eliminated on the second scraper. This permits it to turn 90 deg in relation to the front scraper and increases the tandem rig's overall maneuverability. Pusher power need not be increased because only one scraper is loaded at a time.

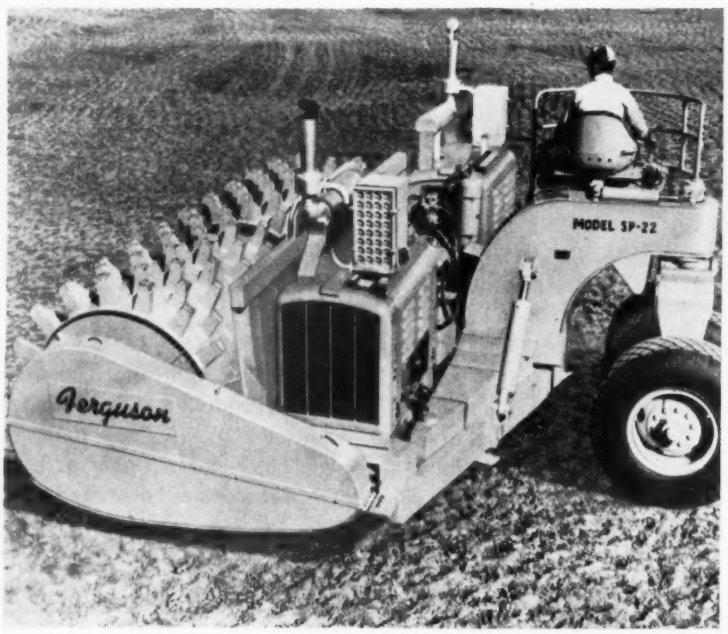
It takes only 30 min to hook up scrapers in tandem. One hitch pin makes the mechanical connection, and plug-in connections hook up the electric cables and air hoses. Most L-W scrapers built since 1947 can be adapted for tandem service. Kits for field conversion of existing scrapers will be available in early 1960.—**LeTourneau-Westinghouse Co., 2301 NE Adams St., Peoria, Ill.**

Roller Operates Well In Forward or Reverse

No need to waste time turning this roller around; it operates equally well in either forward or in reverse at speeds up to 8 mph. The Ferguson SP-22 self-propelled double-drum tamping roller meets the requirements of the Corps of Engineers and the Bureau of Reclamation.

Each 5-ft-dia drum is 6 ft long. The tamping feet are 9¼ in. long. Feet with removable caps are optional. The roller's empty weight is 51,400 lb. With ballast, maximum weight per foot of drum is 5,500 lb. Rollers are equipped with cleaners in front and rear.

A 125-hp GM engine powers each drum through an Allison three-speed transmission and a torque converter. The rig has hydraulic steering and air brakes.—**Shovel Supply Co., Inc., P.O. Box 1369, Dallas 21, Texas.**



Plant Erects Itself In Only 90 Seconds

The Barber-Greene self-erecting stabilization mixing plant travels over the road on its own trailer chassis. At the job site it lifts itself hydraulically into operating position in 90 sec.

Basic component of the unit is a B-G 228 mixing plant. Its capacity is about 400 tph depending upon the material being mixed. A variety of aggregate handling systems can be adapted to the 828 mixer. One such system includes the PA-70 portable belt conveyor with trap feeder. It, too, is mounted on its own running gear.

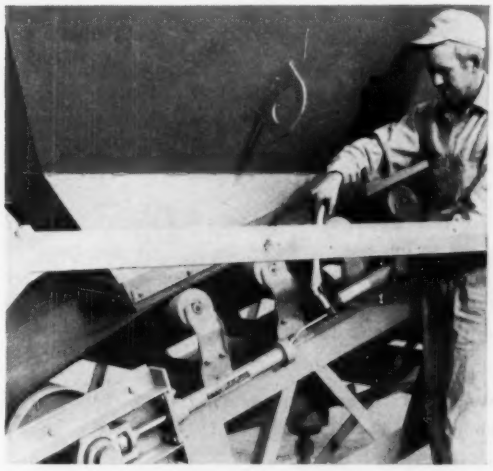
A 10-ton trailer with fifth-wheel hitch, carries the plant. It is 8 ft wide and travels on the highway without a special permit. In position, the mixer's double clamshell discharge gates are 9 ft 2 in. above ground to give adequate clearance for trucks. — **Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill.**

Pressure from Grease Gun Aligns Conveyor, Adjusts Tension

Hydraulic pressure from an ordinary grease gun replaces screw take-ups for conveyor belt alignment and tension adjustment. The Schrock Hydraligner consists of a hydraulic cylinder, a piston inside the cylinder, and a bearing housing. Pressure from a grease gun moves the piston for the desired adjustment. Piston seals maintain the pressure and hold the piston in place.

A welded steel angle frame supports the Hydraligner. This frame is bolted directly to the conveyor frame and acts as a protective housing for the cylinder shaft.

Available shaft sizes range from 1 15/16 in. to 3 7/16 in. Standard adjustment stroke lengths are 14, 18, 24, and 36 in. The unit also can be adapted for remote control installations by extending hydraulic lines from easily accessible stations to the Hydraligner.—**Western Conveyor Co., P.O. Box 357, Boise, Idaho.**



Line's Biggest and Most Powerful

A 120-hp diesel engine powers the W-12 Terraload'r. It is the biggest and most powerful four-wheel drive tractor shovel of the Case line. Its carry capacity is 9,000 lb, and it develops a 23,500-lb breakout force. Standard loader bucket is 2½ yd with optional sizes of 1⅝ and 3½ yd. The bucket tips back 40 deg in the carry position.

Design features include a torque converter, three-speed transmission, power transfer differential on all wheels, power shift, power steering, and power brakes. Top speed is 23 mph in either direction.

The loader bucket is interchangeable with a specially designed dozer blade, brush rake and snow plow.—**J. I. Case Co., Racine, Wis.**

Lima announces new 5-yd. shovel, 140-ton special crane

TYPE 1800

- Standard 5-yd. shovel with 35-ft. boom, 26-ft., 10-in. dipper handle; 7 or 8-yd. dipper for coal handling
- Converts to 112-ton crane
- Variable capacity dragline

TYPE 1800SC

- 140-ton special crane with 21-ft. wide truck base for stability with big lifts
- Converts to variable capacity dragline

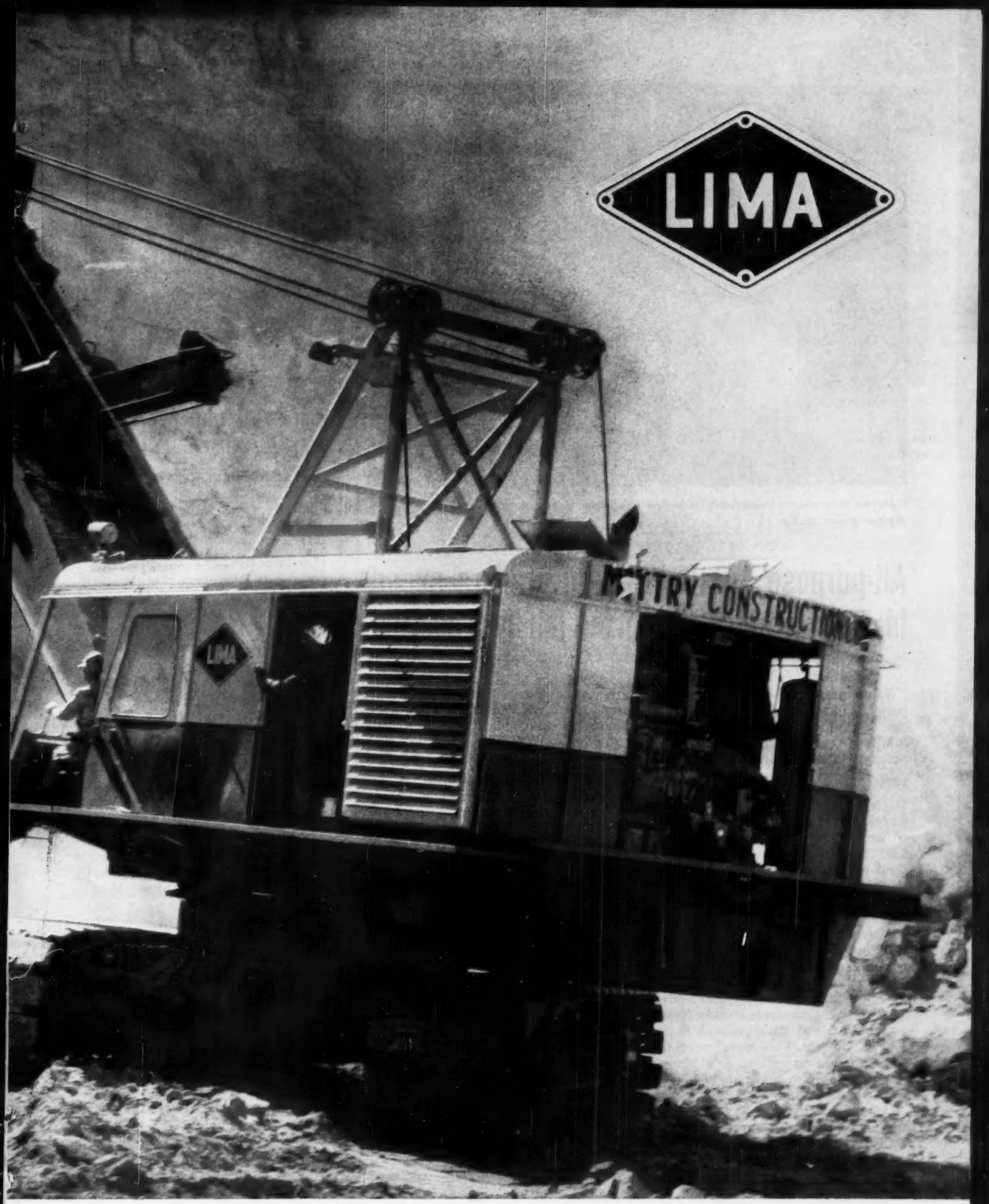
These new Limas are designed to permit knock down for job to job transportation. Side assemblies come off as a unit—including belts, crawler chains and sprockets. Counterweights are removable. Backhitch-telescopic-type gantry folds down to 17-ft., 5-in. overhead clearance.

LOW MAINTENANCE REQUIREMENTS—You get more for your money when you buy a LIMA. They last longer, perform better, and require less maintenance. Lima offers you all of these important features in a single machine—

- **Air control**
- **Torque converter drive**
- **Anti-friction bearings at all important bearing points**
- **Large diameter clutches and brakes**
- **Two-shoe-type swing-propel clutches**
- **Combination rope-chain crowd**
- **Single-inside-type dipper handle, 15″ square**
- **Extra long crane booms and special jibs available**
- **Convertible to crane or dragline**
- **9′-10¼″ dia. roller path**
- **Six cone rollers, six hook rollers**
- **Standard or long, wide crawlers**
- **Diesel or electric power**
- **Knock down for highway transportation**
- **Independent two-drum boom hoist**
- **Independent propel**
- **Auxiliary third drum**
- **Power load lowering**

FACTS AND FIGURES on the new 1800 and 1800SC are yours for the asking. See your nearby Lima distributor today or write to Baldwin-Lima-Hamilton Corporation, Construction Equipment Division, Lima, Ohio.

Lima Type 1800 5-yd. shovel—one of five Limas owned by Mittry Construction, Los Angeles. Shown excavating at Abiquiu earth fill dam project, Shama River, N. Mex.



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Operator demonstrates hydraulically controlled side-shifting action of blade on 6-wheel Austin-Western power grader.

All-purpose Austin-Western graders speed highway project...shorten job by 2 months

"We completed a 3-mile dual highway project 2 months ahead of schedule with the help of our three Austin-Western graders," says Charles Solomon of S. D. Solomon & Sons, Pontiac, Mich.

Versatile A-W's unsurpassed

He tells us, "The A-W's are versatile machines. They can do many more kinds of work than any other single grader sold. They're unsurpassed for jobs in sand or tight corners. They do rough or finish grading, sloping and ditching equally well. We have three Austin-Westerns—a 4-wheeler and two tandems. Maintenance on these machines has been very low.

"As far as I'm concerned, Austin-Westerns are the best graders sold. They far outperform any other grader made."

Austin-Westerns feature exclusive all-wheel drive and steer on both 4 and 6-wheel models. You move more dirt farther and faster with an A-W because of power up front. No dead weight front end to push around.

All-wheel steering permits you to steer the rear to compensate for powerful side-thrust of a fully loaded blade. You can use the full 13-ft. moldboard and still grade ahead in a straight line. Front and rear steer provide amazing maneuverability for short radius work. An A-W can work in close quarters where other graders cannot.

Built to outperform

Austin-Westerns are quality built to outperform! Maintenance requirements are low. Distributor service is excellent. Choice of gas or diesel power. Torque converter optional. Hydraulic controls reduce operator fatigue . . . increase his efficiency.

Learn how Austin-Western graders can speed your jobs to give you added profit! See your nearby A-W distributor or write us today.

Rear steering permits operator to offset machine for extra blade reach in this finish grading operation.

Austin Western 100th YEAR 1859 AUSTIN-WESTERN 1959 PARTNERS IN PROGRESS

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Only Two Indicators Control All Operations

Only two indicators have to be set to operate the A. O. Smith dc welder. One indicator controls the electrode size, the other selects the desired current.

A Continental diesel engine powers the welder. Engine speed is 2,150 rpm when welding and 1,050 rpm when idling. A manual idle control permits reduction of engine speed when welding is not being done. An electric heater coil helps start the welders in cold weather.

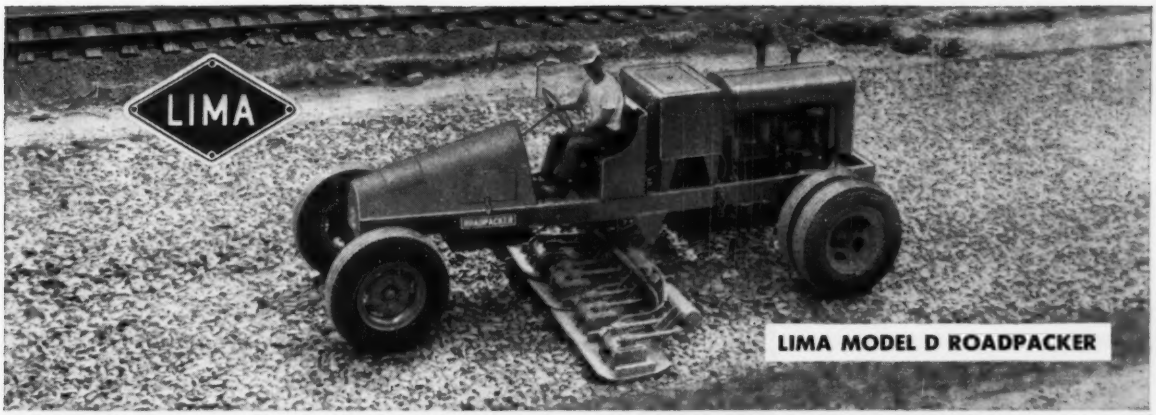
Two models of the welder are available. Output of the 300-amp machine ranges from a minimum of 60 amp at 20 volts to a maximum of 375 amp at 40 volts. Welding range of the 400-amp unit is from 80 to 500 amp at the same voltages as the smaller unit. Maximur. open circuit voltage is 80.—**Welding Products Div., A. O. Smith Corp., Milwaukee, Wis.**

New Diesel Engine

A lightweight, naturally aspirated, six-cylinder Cummins diesel engine develops 160 hp at 2,500 rpm. Its piston displacement is 464 cu in, and the compression ratio is 15.8 to 1. With standard accessories, the C-160 engine weighs 1,555 lb.

A turbocharged version, the C-175 turbodiesel, is also available. It develops 175 hp at 2,500 rpm. The displacement is the same as that of the C-160, but its compression ratio is 16.3 to 1.

Both engines have two intake and two exhaust valves per cylinder and 12-volt electrical systems. A 12-cfm Cummins air compressor is standard on automotive models of the engines.—**Cummins Engine Co., Columbus, Ind.**



Two ways to lower compaction costs with fast, high-density Lima Roadpackers

- ***Compact to 100% density in one pass***—often possible with Lima Roadpackers.
- ***Lay fewer courses***—Roadpackers compact even 10 and 12-in layers in minimum number of passes.

High-production Roadpackers speed construction of highways, parking lots, airfields and earth-fill dams. Vibratory compaction works from bottom to top; fills voids, eliminates shoving. Roadpackers work forward or in reverse. Compact in varying widths and speeds. Travel on-the-job or over-the-road at highway speeds.

Lima Roadpackers are extremely popular with cost-conscious contractors everywhere who are interested in both high performance and low maintenance. Vibrator units are completely sealed, self-lubricated. No external moving parts; no daily maintenance required.

Two Model Roadpackers now available

MODEL D—Six hydraulically controlled vibrator shoes compact up to 600 tons per hour in a 13 ft.,1 in. swath. End shoes fold up for narrow width compaction path or highway travel at speeds up to 30 mph. Compacts from 20 to 95 feet per minute using 4, 5 or 6 shoes.

SUPER—More than doubles compaction performance of any multiple-shoe vibrator machine. Designed for really big jobs. Two rows of six vibrator shoes, hydraulically controlled, compact "tough-spec" materials on production basis from 26 to 268 feet per minute in widths to 15 ft. Highway travel to 24 mph; power brakes and steering, tandem rear drive.

Get compaction cost-cutting facts from your nearby Lima distributor or write to Baldwin-Lima-Hamilton Corporation, Construction Equipment Division, Lima, Ohio.

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LIMA Construction Equipment Division, Lima, Ohio

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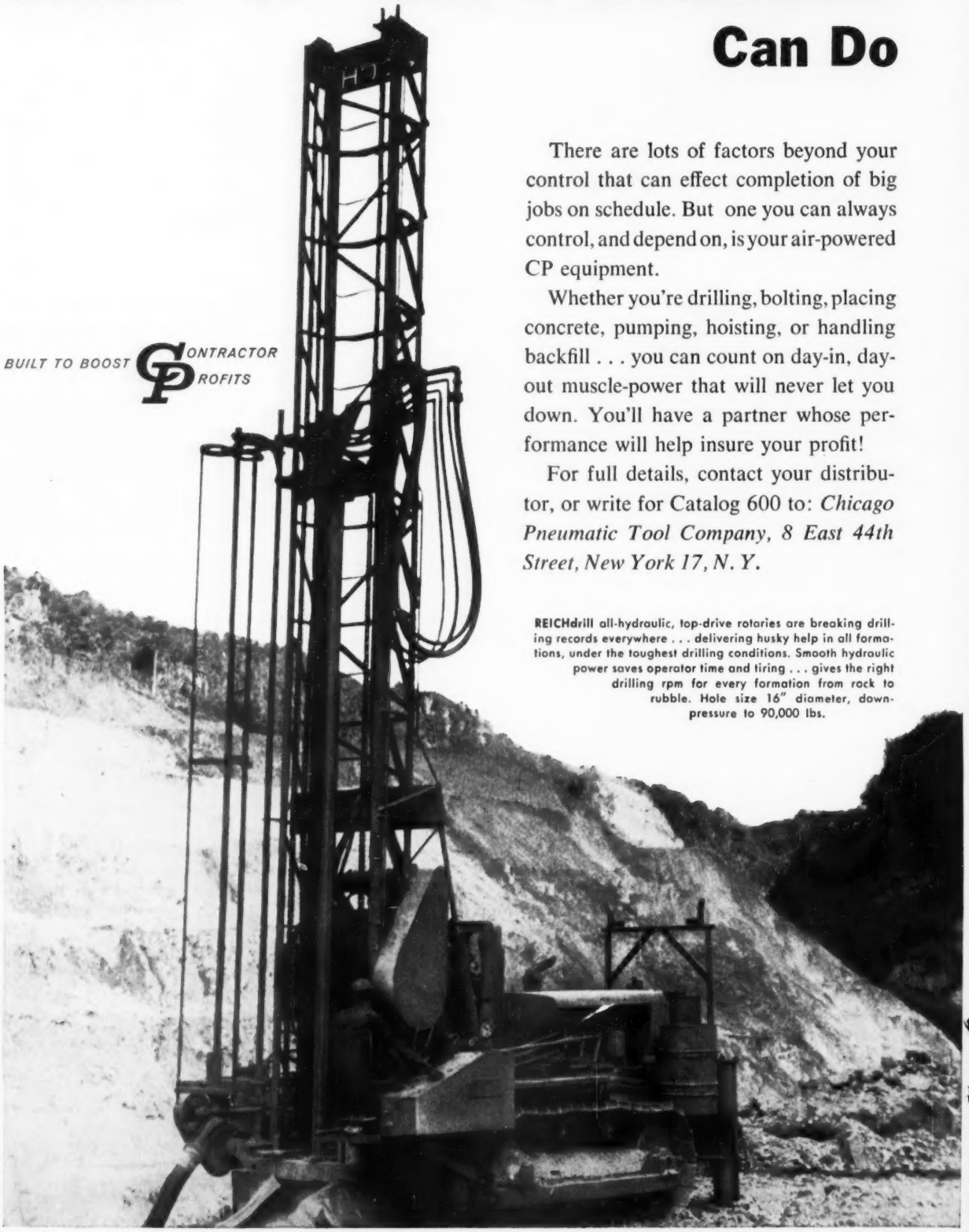
For full details, contact your distributor, or write for Catalog 600 to: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*



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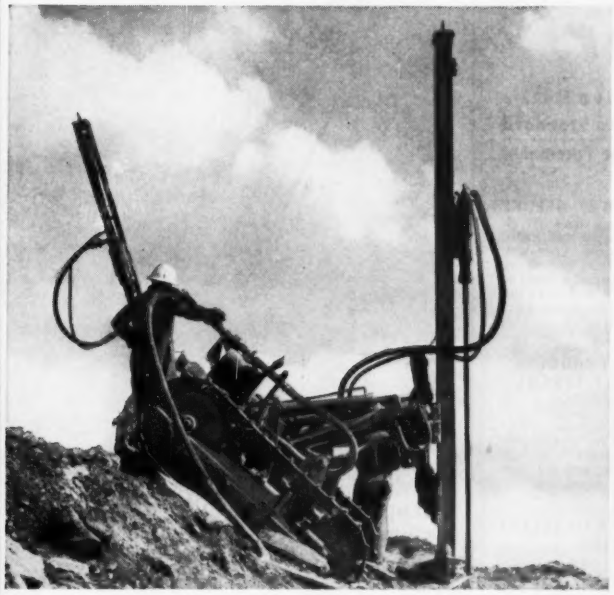
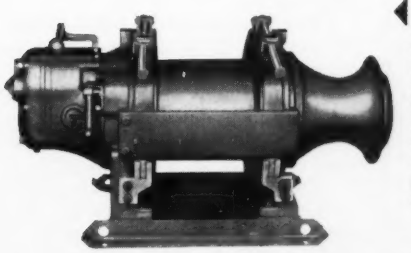
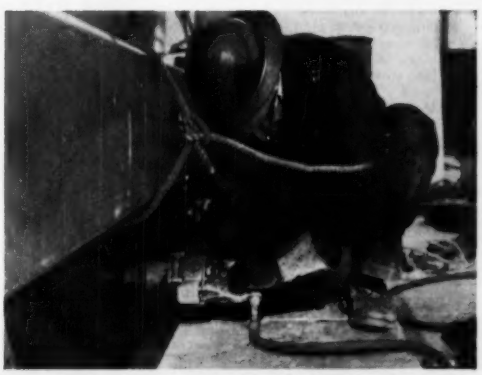


G-800 TRACDRIL, a really hard-hitting percussive drill. Uses 4½" bore Deep Hole Drills—capacity: 3-inch holes to 75 feet. Built for extra bad ground and hard rock. Automatic brakes take hold the instant traction motors are stopped . . . prevent inching . . . insure safety.

CP-600 "POWER VANE" ROTARY COMPRESSORS, shoulder-to-shoulder, or singly, keep air-driven drills slugging 'til you tell 'em to stop. Other capacities from 125 to 900 cfm, gasoline or diesel engine drive.



CP AIR WINCH with Cathead: Capacity to 4000 lbs; cable speeds to 175 fpm at full load. Operator has *absolute* control over infinite combinations of hoisting and lowering speeds, and braking action. Exclusive Cathead arrangement operates independently, permits extremely accurate spotting of loads.



CP-610-RP REVERSIBLE IMPACT WRENCH... favorite of bolting gangs everywhere. Light weight and short overall length makes it easy to handle. Capacity to 1¼" bolt size. Power bonus means fast rundowns and absolute tightness. Torque Control models available.

CP-20 PORTABLE SUMP PUMP can handle 185 gpm at 70 ft. head; tandem models 235 gpm at 120 ft. head. This pump doesn't need watching... just hook-up the air and discharge lines and submerge it. No priming required, and no damage if pump runs dry.

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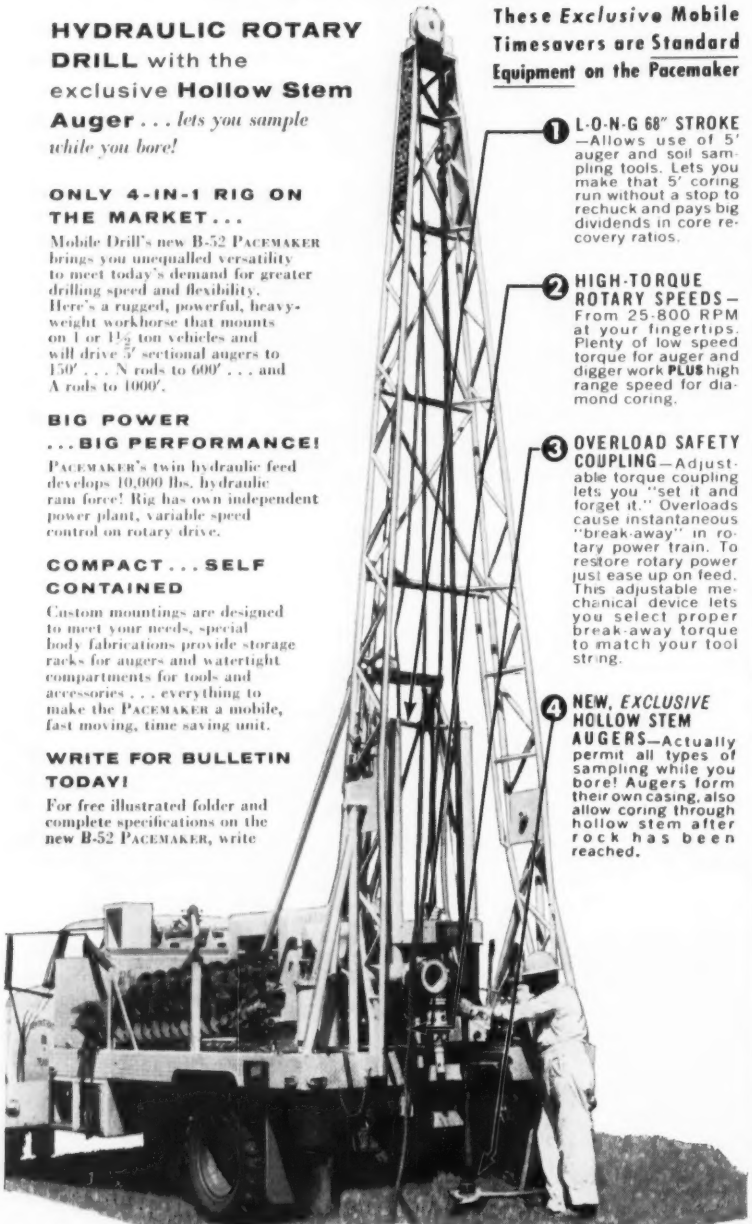
1. **L-O-N-G 68" STROKE**—Allows use of 5' auger and soil sampling tools. Lets you make that 5' coring run without a stop to rechuck and pays big dividends in core recovery ratios.
2. **HIGH-TORQUE ROTARY SPEEDS**—From 25-800 RPM at your fingertips. Plenty of low speed torque for auger and digger work **PLUS** high range speed for diamond coring.
3. **OVERLOAD SAFETY COUPLING**—Adjustable torque coupling lets you "set it and forget it." Overloads cause instantaneous "break-away" in rotary power train. To restore rotary power just ease up on feed. This adjustable mechanical device lets you select proper break-away torque to match your tool string.
4. **NEW, *EXCLUSIVE* HOLLOW STEM AUGERS**—Actually permit all types of sampling while you bore! Augers form their own casing, also allow coring through hollow stem after rock has been reached.



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Crawler Crane Is Completely Air-Powered

Only two levers control the air supply and actuate all turntable clutches on the Lorain 56 crane. The crawler also is air-controlled —making the unit a completely air-powered machine.

It can handle a 40-ton load and a 110-ft boom. In addition, boom tip extensions may be added up to 40 ft. The crawler-mounted undercarriage is 14 ft long and 13 ft wide.

When rigged as a shovel, the machine's torque converter adjust engine torque to digging conditions and prevents engine stalling. The entire travel mechanism is enclosed in a gear case and runs in an oil bath.

The rear counterweight can be detached to reduce weight for transportation. The unit converts to a dragline, clamshell, crane, or hoe.—**The Thew Shovel Co. Lorain, Ohio.**

Spray Curing Machine Works Without Operator

The Flex-Plane automatic spray curing machine can be used with one operator or it can be preset for unattended operation. The machine's travel speed is adjust-

able to keep pace with the rest of the paving train.

Only a small portion of the pump output is used at the spray nozzles. Excess material is pumped back into the drum. This eliminates waste and keeps the material in the drum agitated to prevent separation and settling. A fluid regulator maintains a constant spray pattern. — **The Flexible Road Joint Machine Co., Warren, Ohio.**

Base Stabilizer Plant

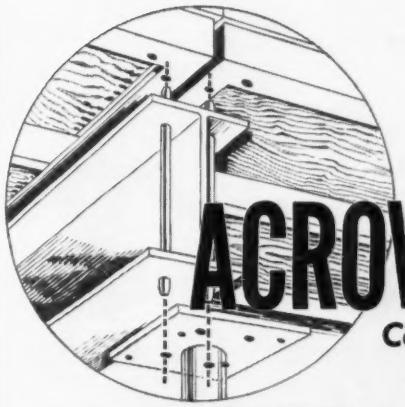
The Madsen 567 portable base stabilizer plant is equipped with a pugmill mixer that can produce as much as 600 tph of stabilized base. A push-pull gate controls the mixing pressure by maintaining a constant depth of material in the pugmill.

Cold feed can be brought into the mixer on either side of the plant or at the end. The mixed material hopper is located in the center of a drive-through area that permits access from either of two directions. Air-operated clamshell gates control the discharge. Clearance for trucks is 9 ft 6 in.

Diesel or gasoline engines or electric motors may be used to power the pugmill. The power unit is mounted on a separate sub-frame that permits the use of various motors or engines without extensive alterations.

Other equipment includes a water pump and drive, shut-off valve, and adjustable water meter and spray bars. A screw conveyor and metering valve controls the cement supply.

The plant is constructed in separate units and may be purchased in parts. These are the leg frame unit, mixed material bin unit, continuous mixer unit, and engine frame unit. — **Madsen Works, Div. of Baldwin-Lima-Hamilton Corp., Lima, Ohio.**



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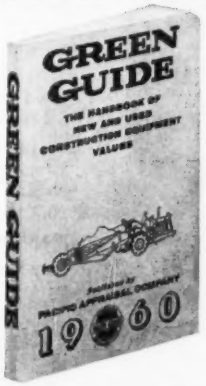

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Everything Is Hydraulic on This Excavator

All operating functions of the Davis BR-5 HydraXcavator are hydraulically powered and controlled. Even the outriggers, mounted on the rear of the carrier chassis, are positioned hydraulically.

A short wheelbase on the carrier helps get this rig into tight places. On the job, a declutch in the drive shaft permits the operator to maneuver the entire unit from the excavator cab. His controls include steering, forward and reverse, locking of the brakes, and setting of outriggers.

The excavator swings a full 360 deg, and it can dump a load over the front of the carrier. The boom reaches 20 ft from the center of swing; its telescoping action has a range of 7 ft.

The end attachments on the HydraScope boom rotate 90 deg to either side of center. This makes the unit suitable for dressing slopes and embankments.

A Continental F-266 engine powers the carrier. Its maximum road speed is 40 mph. Another Continental engine on the excavator supplies power for all of the hydraulic operating functions.

A 3/8-yd 24-in.-wide bucket is the standard boom attachment, but narrower buckets are also available. Optional boom attachments include a ditching bucket, a scraper and backfill blade, and a single-tooth ripper.

The unit also can be rigged as a crane with a telescoping boom or as a backhoe.—**Davis Engineering, Inc., P.O. Box 127, Dowagiac, Mich.**

Loads Tough Materials Easily

Loading and unloading are hydraulically powered on the Allis-Chalmers TS-360 motor scraper. Bowl lift jacks exert a force at the cutting edge for easier loading in tough materials. For unloading, twin telescoping cylinders supply power for ejection of the load.

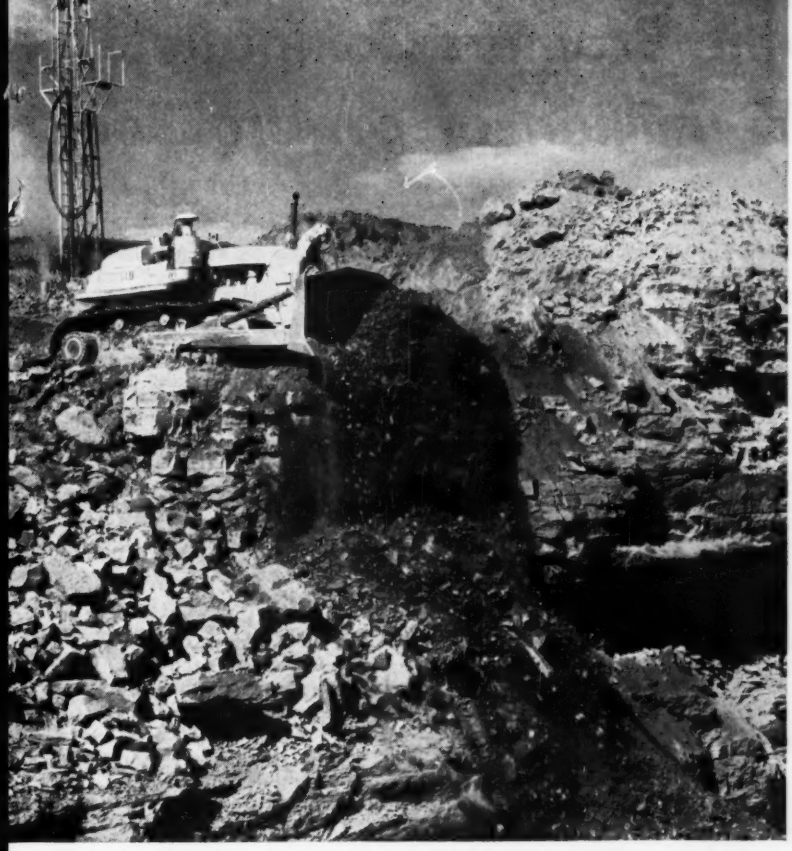
Steering is hydraulic also, giving the unit good maneuverability. The scraper can make a 180-deg turn in a width of 35 ft 8 in.

Capacity of this unit is 30 yd heaped or 22.3 yd struck. The Allis-Chalmers turbocharged engine develops 340 hp. Maximum speed is 26.3 mph.—**Allis-Chalmers Mfg. Co., Milwaukee, Wis.**

Ripper Fits Motor Graders

Adams motor graders now can be equipped with a hydraulically operated, rear-mounted ripper that can penetrate to a depth of 12 in. The ripper is specially designed for Model 660 and 550 Adams motor graders. It is built by the American Tractor Equipment Corp.

The ripper can accommodate seven ripping shanks. It is mounted to the grader's frame to take advantage of weight for better penetration. But this ripper does not replace the front-mounted scarifier necessary for work around obstructions. — **LeTourneau-Westinghouse Co., 2301 NE Adams St., Peoria, Ill.**



"CLASH-BOX" robbing your CASH-BOX?

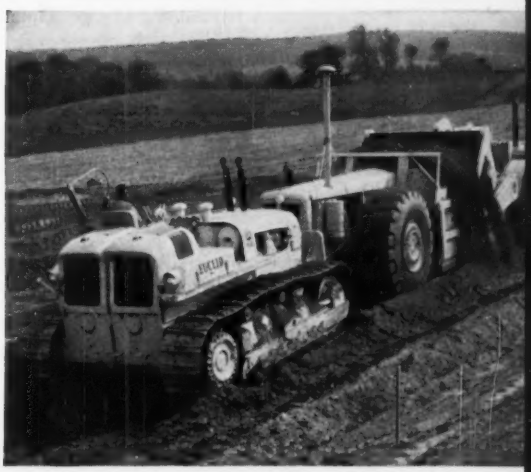
Crawlers without full-power shift are obsolete . . . and costly!

If your crawlers have master clutches and manual shift transmissions—"clash-boxes" as they're commonly called—you may be passing up profits that should be yours.

With proven Torqmatic Drive in the Model C-6 and the TC-12, Euclid Crawlers provide full-power shift and instant reverse. There's no loss of power or momentum when changing from one speed range to another . . . no delay for clutching and shifting . . . and with a flick of the wrist you change travel direction fast. It's a dependable power train, too . . . proved in thousands of "Euc" earthmovers on every kind of job.

Have your dealer show you how Euclid Crawlers have more productive capacity on any tractor work . . . dozing, ripping, push loading big scrapers, or towing heavy loads. The seconds they save on every work cycle can add up to more cash in your your cash box!

EUCLID Division of General Motors, Cleveland 17, Ohio
Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland.



Proven Torqmatic Drive provides smooth steady flow of power . . . full-power shift . . . instant reverse . . . easy operation. For push loading scrapers the fast maneuverability of "Euc" crawlers cuts scraper cycle time and steps up production . . . changes from one speed range to another, and from forward to reverse and back again, are made under full power . . . there's no clutching.

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

A profile of Blythe Brothers Company... to produce $172 million of construction

Jack and Joe Blythe established the Blythe Brothers Company of Charlotte, North Carolina back in 1921. They started with a few hand scrapers and mules. In the early days, they tackled difficult road work, water lines and sewer construction. Today they are one of the Southeast's leading contractors.

As the Blythe Brothers established a reputation for good work, they added more equipment and bid for more contracts. They gradually extended operations to other states, including South Carolina, Virginia, Georgia, and Florida. And in the last decade, this contractor extended his construction activities overseas in Africa and Puerto Rico.

Blythe tackles diversified construction

According to Blythe Brothers, taking on diversified work helps to keep their equipment in operation . . . and enables them to tackle different work in different locations. Today, Blythe Brothers engage in airport, highway including concrete and asphalt paving, earthmoving, dam, power plant, sewer and water line construction. They also do housing and other building construction.

Blythe has been continuously engaged in this work for the Blythe management knows how to deploy and combine skilled manpower with efficient machinery. The company also has a program for training key personnel to handle a variety of projects.

Operates 13 subsidiary companies

In addition to the parent company, Blythe Brothers wholly owns five subsidiaries and has a substantial interest in eight others. All subsidiaries are designed to either perform a specific job or to expedite operations in a specific locale. The company has built modern plants for the manufacture and sale of concrete blocks, ready mixed concrete and concrete pipe. Blythe also operates these plants through subsidiaries. Several modern asphalt plants are owned and operated by this contractor. The necessary automotive equipment to deliver the materials to the job site are also owned and operated by Blythe Brothers.

Blythe Co. of Puerto Rico does $38 million in 10 years

The equipment inventory shown on this page includes the equipment of Blythe Brothers' subsidiaries. One of the most important of these is Blythe Co. of Puerto Rico which has been in operation since 1950. It is headed up by C. H. Cotter and does the following types of construction: storm and sanitary sewers; earthmoving and paving on highways; bridge and other types of heavy construction.

$172 million of work completed in 10 years

Indicative of the size and scope of Blythe Brothers' operation both in the United States and overseas is the $172 million of construction of all types it has completed in a 10-year period. In 1959, the firm completed $9 million of work.

A permanent staff of 100, backed up by 750 workers, combined $3½ million of machinery and $2.3 million of materials to produce this work in 1959. The direction of the company's operations rests in the hands of a team of key men with wide experience and know-how. At the head of this top management group is F. J. Blythe, Jr., President; C. N. Whilden, Exec. Vice President; C. H. Cotter, Walter L. Smith, W. J. Stribling, R. N. Blythe, C. W. Ramsey, Vice Presidents, W. V. Williamson Jr., Sec'y & Treasurer.

Works 1900 units of equipment

One of the reasons for this contractor's success in today's highly competitive contracting business is modern equipment. That's why Blythe has emphasized equipment purchases of latest types . . . and large investments in equipment maintenance. Some of the 1900 units in this contractor's inventory are shown below:

BLYTHE BROTHERS INVENTORY

- **38 automobiles** — (Ford, Buick)
- **140 trucks** — (Ford, Chevrolet, GMC)
- **8 haul units** — (Euclid)
- **8 lubrication trucks** — (Alemite)
- **47 crawler tractors** — (Caterpillar, Euclid, International)
- **10 tractor shovels** — (Hough, International, Fordson)
- **13 rubber tired tractors** — (Ford, International)
- **30 scrapers** — (Euclid)
- **5 Gradalls**
- **28 graders** — (Caterpillar)
- **3 rooters** — (LeTourneau-Westinghouse)
- **11 field office trailers**
- **4 truck cranes** — (Lorain, Northwest)
- **26 generators** — (Kohler)
- **35 crawler cranes, shovels** — (Northwest, Koehring, Bucyrus-Erie, Link Belt)
- **5 wagon drills**
- **1 Air Trac** — (Ingersoll-Rand)
- **35 paving breakers**
- **40 jack hammers**
- **34 compressors** — (Ingersoll-Rand)
- **48 rollers and compactors** — (Galion, Buffalo-Springfield, Tampo, Jackson)
- **77 buckets** — (concrete, clamshell, drag line)
- **2 concrete pavers** — (Koehring)
- **13 asphalt pavers** — (Blaw-Knox, Cedarapids)
- **1 concrete spreader** — (Jaeger)
- **3 concrete finishers** — (Jaeger, Heltzel)
- **2 curing machines** — (Rex)
- **6 asphalt plants** — (Cedarapids, Barber-Greene, Simplicity, Madsen)
- **7 asphalt distributors**
- **1 asphalt curb machine** — (Stevens)
- **6 pile hammers** — (McKiernan-Terry, Vulcan)
- **88 pumps** — (Marlow, Gorman-Rupp)
- **9 trailers** — (Rogers)
- **13 welders** — (Hobart, Lincoln)
- **38 vibrators** — (Jackson)
- **8 stone spreaders** — (Jaeger, Jersey)
- **5 trenching machines** — (Buckeye, Cleveland)
- **37 two-way radios** — (Motorola)
- **4 base stations** — (Motorola)
- **1 airplane** — (Beechcraft)
- **1 hydraulic ripper** — (Ateco)
- **2 gravel crushing and sand plants**
- **1 concrete block plant**
- **125 miscellaneous air tools, electric drills, air tamps, saws and shop equipment**

what it takes in 10 years

$1.6 million of new equipment purchased in 1959

The nature of Blythe Brothers work coupled with its operations through subsidiary companies demands large amounts of equipment. In 1958, Blythe purchased *$950,000 of new equipment*, and *another $1.6 million in 1959*. On a single highway project of $2.4 million, running 10 miles, Blythe Brothers invested over $300,000 in new equipment.

$700,000 a year for maintenance

Charlotte Equipment Company (subsidiary) maintains a modern repair shop with 45 to 50 mechanics who service and overhaul trucks, automobiles and all heavy equipment. $700,000 is invested each year for this operation.

Key men influence and control purchases of equipment

Division of responsibility and the influence of key men on purchasing is common among successful contractors with diversified work in widely scattered locations. Blythe Brothers is departmentalized for this reason. The pipe and utilities, grading and structures and paving divisions are headed by a department manager. These managers get the reports and recommendations from superintendents, project managers, shop superintendents and other key men, on equipment they need and use. Department managers pass along all recommendations including their own to top management.

As president F. J. Blythe Jr. says: "It is through the recommendations of these key people that we decide on the type, size and brand of the equipment which we will purchase."

CONSTRUCTION METHODS is preferred monthly of contractors and advertisers

CONSTRUCTION METHODS magazine reaches the key men in Blythe Brothers Company, including president F. J. Blythe Jr. The value of the magazine to the men in Blythe Brothers and other important contractors throughout the nation is evidenced by the more than 48,000 men in construction who pay for it. CONSTRUCTION METHODS is the preferred construction monthly among important contractors. Advertisers, too, recognize the value of this publication for they ran more pages of advertising in CONSTRUCTION METHODS in 1959 than in any other national monthly.

Construction Methods AND EQUIPMENT

A McGRAW-HILL PUBLICATION

330 WEST 42ND STREET, NEW YORK 36, N. Y.

F. J. Blythe, Jr.
President, Blythe Brothers Company

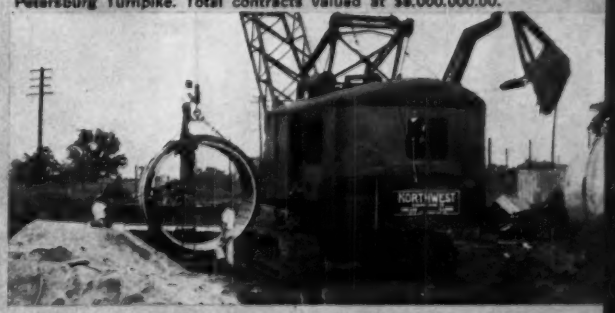
What Mr. Blythe says of CONSTRUCTION METHODS Magazine:

"We have found CONSTRUCTION METHODS to contain many new and valuable ideas which have proved successful in the field, on difficult steel erection problems, concrete forming, and plant setups for paving and rock crushing operations. The non-technical language makes it particularly interesting to foremen and superintendents who strive to accomplish good work at lowest costs. Other important features include reports on new improvements being made on construction machinery."

C. H. Cotter, Vice President, Blythe Brothers Co. . . . subscriber to CONSTRUCTION METHODS since 1944 says:

"CONSTRUCTION METHODS covers techniques and equipment performance of different kinds of work which are of interest to me. It is easy to read and understand. Often I tear out and file articles of particular importance. I like to read the ads which provide performance information on equipment."

Some of Blythe Brothers paving equipment shown along with cranes used on bridge and highway projects. Part of Richmond-Petersburg Turnpike. Total contracts valued at $8,000,000.00.



One of Blythe Brothers sewer projects with several of its 39 cranes shown in operation.

Easy Starts for Cold Diesels

By HERB ORWIG
Development Engineer, Trojan Div.
The Yale & Towne Mfg. Co.

COLD WEATHER makes it tough to start diesel engines. But the temperature need not present any difficulty to the operator who knows his diesels.

A thorough understanding of diesels will enable an operator to start his engine quickly and efficiently and will eliminate the possibility of damage to the engine from incorrect starting procedure.

First, here are some general rules:

1. Keep the engine in good operating condition. Good valves and ring seating give the maximum compression necessary for easier starts and smooth running. Clean injector tips assure proper atomizing and even distribution of fuel.
2. Keep the battery at peak charge. Low temperatures reduce battery efficiency.
3. For best results use ether starting fluid or glow plugs.
4. Keep fuel clean and fuel lines free of water or air locks.
5. If shelter is available for your equipment, use it.

The diesel engine has no spark plugs so it relies on high compression to heat the air in the cylinder enough to burn the fuel injected into it. When the engine is cold, the metal parts rapidly absorb the heat in the cylinder and prevent ignition.

Starting Aids

Assuming the starter turns the engine at normal starting speed, the operator has a choice of two ways to get proper starting conditions: First, heat the air introduced into the cylinder; second, help out with a fuel that burns at a lower temperature than diesel fuel.

In some open chamber diesels, such as the Cummins, a glow plug is mounted in the intake manifold. When fuel is sprayed onto this glowing element a small fire is kindled in the intake manifold, which acts as a precombustion chamber. Thus heated air is drawn into the cylinder, giving enough of a boost to start the engine.

Ignition begins in a fractional part of the compressed air in each cylinder as the fuel is injected. Usually failure in starting with glow plugs is the result of insufficient heating of the plugs before cranking is begun.

Ether and ether base fluids are fuels with a low flash point. Starting with these fuels gives instantaneous results. Ether fluids are high-energy fuels; if used carelessly or too freely, they can cause serious mechanical damage to the engine because of abnormal compression pressures.

If an engine is equipped with glow plugs, NEVER use ether and the glow plug at the same time. A nasty backfire or perhaps even more serious damage can result.

Ether starting fluids are available in gelatin capsules, pressure capsules, and aerosol-type pressure cans. Each form has its own hardware to direct the ether to the engine intake manifold. All of them work effectively. Both types of capsules are one-shot propositions, but the aerosol can contains a more generous supply. Warm aerosol cans and capsules vaporize more quickly, so it pays to keep them indoors until ready to use.

Very cold weather causes crankcase oil to become viscous or thick. It is difficult for the oil pump to circulate this thickened oil. As a result, during initial operation, cylinder walls and bearings are starved for oil for a short time. It is especially important to avoid speeding the engine during this critical period.

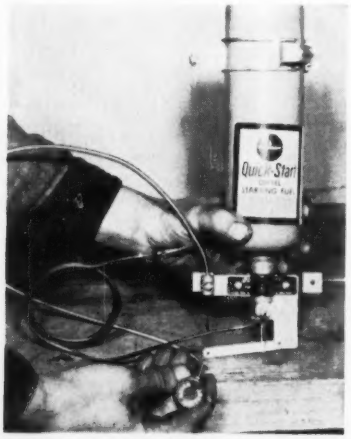
Multiple viscosity oils, available on the market, are thinner when they are cold. They have a low viscosity oil base with certain resins added that thicken as they warm up. But diesel engine manufacturers have been reluctant to approve their use, and it's always safest to follow the manufacturer's recommendations.

If practical, drain the oil from your engine while it is warm, at the end of the working day. It can be warmed in the morning and added just before cranking the engine, with good results.

Starting Motors

Most automotive type diesels have an electric cranking motor as a utility starter. Because accessory loads vary so widely, the choice of batteries is the result of experience. Under normal conditions most batteries are ade-

GELATIN CAPSULE — This kit holds enough ether to start an engine only once. The fuel is injected with a hand pump.



ETHER KIT—Replaceable aerosol supply tank holds enough ether to last through a whole season if fuel is applied sparingly.

quate, but cold weather causes frequent failures. Generally, more and larger plates mean a greater reserve of cranking power.

Gasoline starting engines give unlimited cranking duration once they are started. Air starters are excellent because they give a higher cranking speed, but a compressor unit is needed to supply enough air.

If a shed is available to shelter your equipment, use it. Fully enclosed sheds can be heated enough to be of real benefit in starting the engine because the air, crankcase oil, and coolant all benefit from the warmth.

In some cases cylinder head bolts may be replaced by special bolts with built-in electrical heating units. These heaters give warmth to the coolant in the water jacket and operate on house current electricity that may be available in your shed.

Once the engine is running smoothly, it will warm up to its most efficient operating temperature more rapidly if it is run through its ordinary work cycle at a moderate pace. A good rule is to let the engine temperature come up to nearly normal before demanding full engine power.

Useful Information

These Construction Methods reprints contain valuable information for contractors. Send your requests to:

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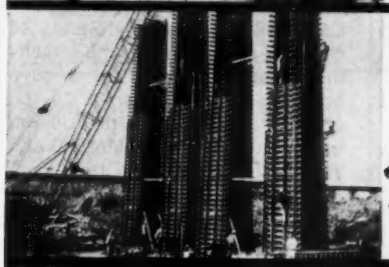

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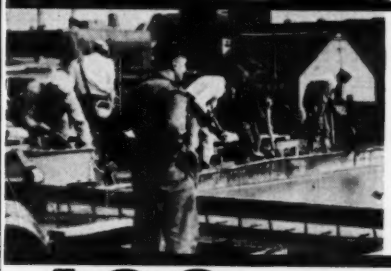

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Made in Hose Ends and Male and Female I. P. T. Ends, in sizes up to 1".

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Rock Iron Company, Inc., Quarryville, Pa. · Precision Drawn Steel Company, Camden, N.J.

New Publications

These catalogs and bulletin from manufacturers contain useful information about construction equipment and materials. To obtain a copy, write directly to the manufacturer at the address given.

CRANES — Bay City Series 40 carriers, cranes, and crane attachments are described in a 20-p booklet. Included are the 20-ton crawler crane, 25 and 30-ton truck-mounted CraneMobile, and 25-ton self-propelled CraneWagon. The shovel, clamshell, dragline, and hoe in the series are also included.—**Bay City Shovels, Inc., Bay City, Mich.**

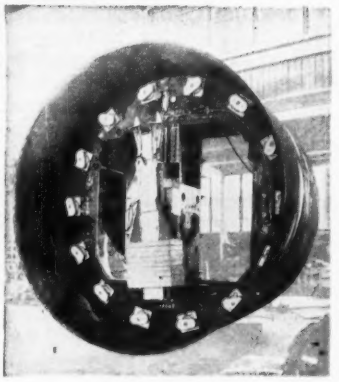
MULTI-ARC WELDING — Aspects of multi-arc welding are covered in a 71-p book, Guide to Better Welding. The publication compares initial operating and maintenance costs of multi-arc and single-operator welding under varying conditions. Applications of multi-arc welding to tungsten arc welding, consumable electrode welding, stud welding, and arc air gouging are outlined. —**J. B. Nottingham & Co., Inc., 441 Lexington Ave., New York 17, N.Y.**

TESTING EQUIPMENT — The 1960 Soiltest catalog contains more than 3,400 items for field and laboratory tests of concrete, soils, aggregates, asphalt, and construction materials. Large sections of the 324-p catalog are dedicated to drilling and sampling.—**Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.**

CONCRETE JOINT FORMER—A booklet available from American Sisalkraft explains the plastic strip method of forming contraction joints in concrete pavement. Contraction joint theory and a comparison of major joint forming methods are included. So is a sample of the Sisalkraft joint former. — **American Sisalkraft Corp., 55 Starkey Ave., Attleboro, Mass.**

STUD WELDING FASTENERS—A 50-p book details standard designs and specifications for stud welding fasteners, complete with dimensions, typical use descriptions, ordering, and specifying information. Weight charts, special

MAYO SANDHOG EQUIPMENT



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machining operations, and stud welding equipment are shown. The book is available on letterhead request only.—**KSM Products, Inc., Merchantville 8, N.J.**

BASE STABILIZER PLANT—A portable base stabilizer plant, manufactured by Madsen for highway and airport construction, is illustrated in a brochure. Drawings show the location of the various components and overall dimensions of the 600-ton-per-hour plant.—**Madsen Works, Baldwin-Lima-Hamilton Corp., P.O. Box 38, La Mirada, Calif.**

DRAGLINES—A 16-p brochure covers DragScraper and cableway systems manufactured by Sauerman. Four pictorial sections show applications for excavating and hauling, storage and reclamation, engineering and construction. — **Sauerman Bros, Inc., 620 S. 28th Ave., Bellwood, Ill.**

CONCRETE FORMS — A catalogue covers Form-Crete steel forms for precasting reinforced or prestressed concrete. It includes a description of a form-handling frame that will strip or reposition side forms in one action. And it illustrates the form-lock design. —**Form-Crete Dept., Food Machinery & Chemical Corp., P.O. Box 1718, Lakeland, Fla.**

CRAWLER TRACTOR — Euclid has issued a 24-p brochure on the Model C-6 crawler tractor. The booklet contains condensed specifications and performance charts and data on Torqmatic drive, hydraulic track tensioning, and cable control attachments.—**Euclid Div., General Motors Corp., Cleveland 17, Ohio.**

PRESTRESSED CONCRETE — The role of Pozzolith in achieving high concrete qualities for prestressed work are shown in studies of 16 concrete projects published in a 20-p booklet. Both pre-tensioned and post-tensioned projects are featured. — **The Master Builders Co., Euclid and Thomas Aves., Cleveland 3, Ohio.**

SCAFFOLDING — Scaffolding set-ups for concrete construction are described in an 8-p folder on tubular steel scaffolds. The booklet explains multiple bracing as well as standard and basket-weave bracing methods.—**Superior Scaffold Co., 5624 Bankfield Ave., Culver City, Calif.**

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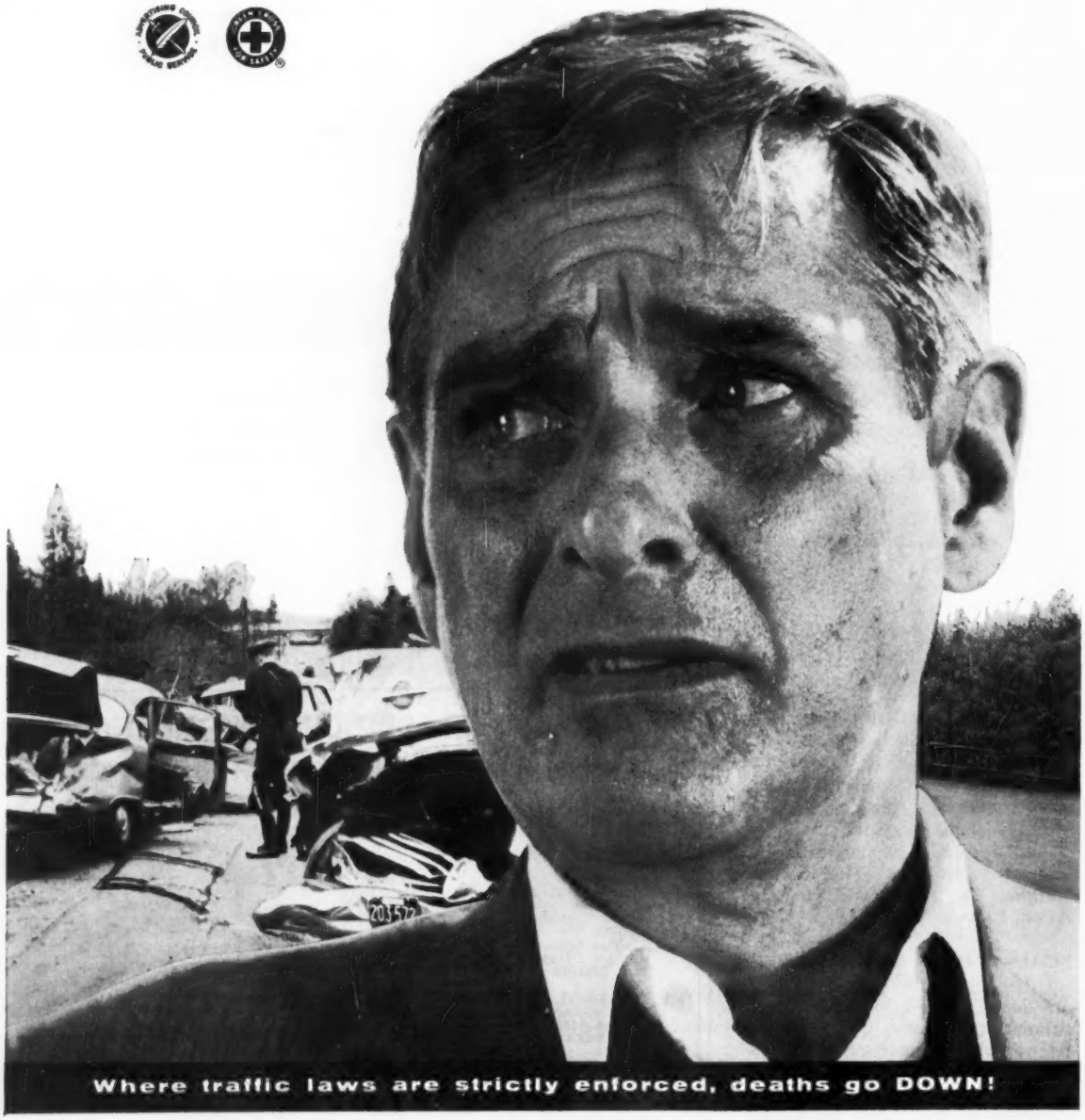

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Methods Memo . . .

Records Fall Fast

Four new world tunneling records in two months. That's the claim of the joint venture contractors on the big Snowy Mountains Project in Australia.

The latest record belongs to a 40-man crew of Utah Construction Co. and Brown & Root Sudamericana, Ltd., who drilled and blasted through 590 ft of rock and earth in six days last month.

Working around the clock, they removed more than 2,525 cu yd of material from the 11-ft-dia tunnel. When completed the tunnel will be 10½ mi long. It is being driven about 750 ft below the surface.

Soviet Roadbuilding Rigs

A Russian exhibition in Mexico City last month was a disappointment to many Mexican construction men.

The Russians had said in their advance publicity that they would exhibit "machinery for the construction of medium sized roads". They claimed these machines would be "especially suited" to Mexican needs.

But when the exhibition opened, the only construction machine around was what the Russians called "Bulldozer-259." It turned out to be an almost exact copy of the 1939 model Caterpillar D7.

Kudos for These Carpenters

Contractors in Buffalo, N. Y., can be sure any carpenters they hire are skilled in the trade. Since last June all carpenters in the area must pass both written and oral examinations to qualify for a job.

The Buffalo Carpenters District Council writes this testing and qualifying program into its collective bargaining agreements with the three major employer groups.

The program establishes a Joint Policy and Qualification Board whose purpose is "to enable the employer to secure at all times sufficient forces of skilled workmen, to eliminate uneconomical employment practices occasioned by the hire of unskilled men, and to preserve the classifications of the various skills of the carpentry craft."

The board has set up several panels, also composed of both labor and management men, to conduct examinations of applicants for work as carpenters. Separate tests are given for the residential, commercial, and millwork classifications. A fourth classification for floorlayers may be added later.

An applicant who fails the test is entitled to another try at it within 30 days. If he fails a second time, he may appeal to a special appeals board headed by Dr. Ernest Notar, dean of the Erie County Technical Institute. If the appeal is denied, he is not eligible to take the examination again for 12 months.

The examination may be waived if the applicant can show proof of past satisfactory employment with a participating employer. But the agreement specifies that a man is not presumed to be qualified merely because he holds a union card.

In the six months since the plan went into operation, more than 70 applicants have taken the tests, and 50% of them have failed.

Robert R. Logan, executive vice president of the Construction Industry Employers Association, and Herman F. Bowdewes, president of the Carpenters Council, said the testing program is designed to "take the trial and error method out of the carpenter's trade."

"Employers," Bowdewes said, "are paying top rates and are entitled to skilled workers. If they don't get top workers, they are not getting what they should for their money."

Back to Work at Glen Canyon

The long strike—169 days—at Glen Canyon Dam is over. Merritt-Chapman & Scott, the prime contractor, and the building trade unions reached a settlement that provides a 50 cent an hour pay differential over basic wage rates.

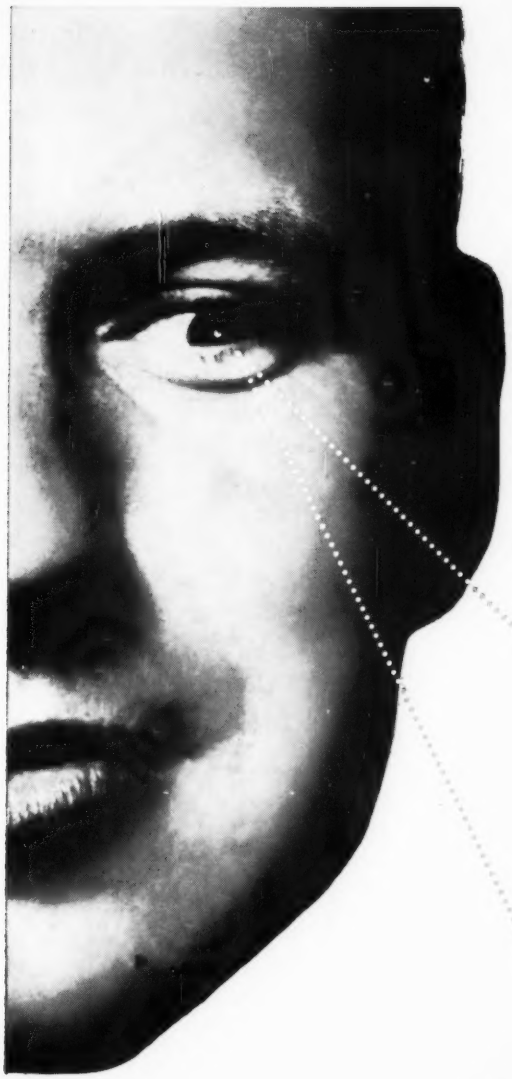
Workers originally had demanded $6 a day subsistence pay.

Well, Maybe

Michigan Highway Commissioner John Mackie cites the use of this team of oxen as an example of the enterprise contractors displayed during the worst fall and early winter construction season in recent history.

Heavy rain and snow, Mackie said, limited contractors to less than 10 full working days a month and "mired earthmoving equipment to a standstill."

So contractor C. E. Utterback of Mt. Pleasant, Mich., rented the team of oxen to clean out drainage ditches along a six-mile highway reconstruction job in western Michigan. The oxen are pulling a board scraper.



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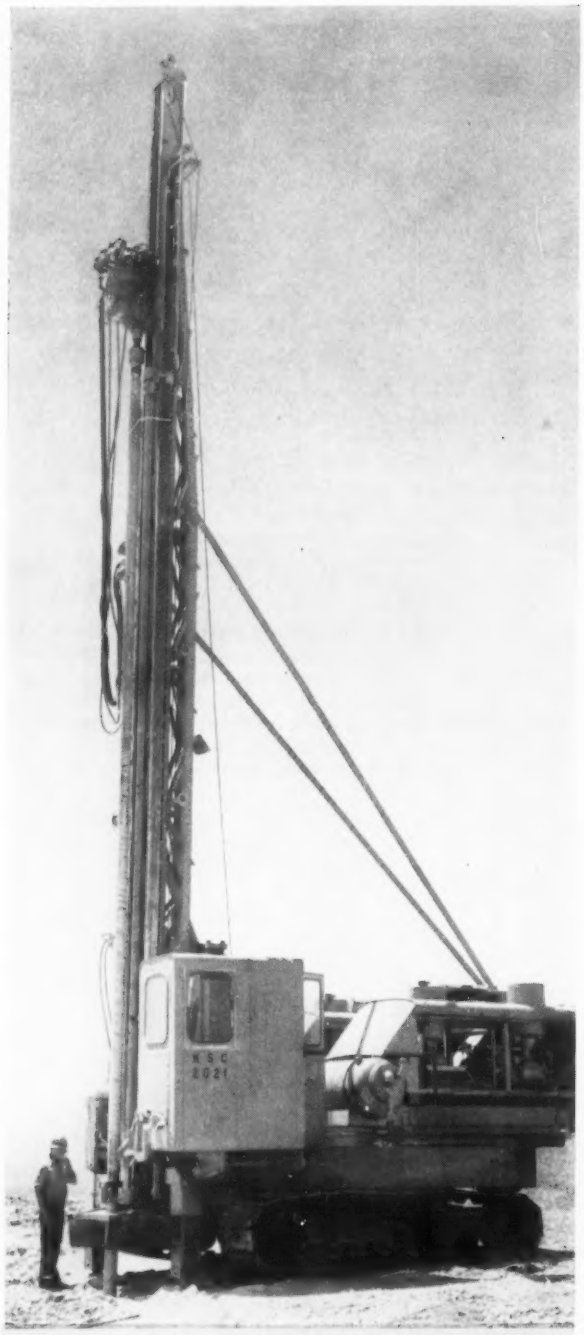

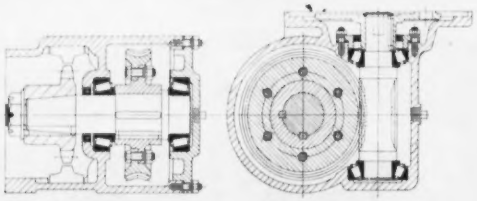

How Timken bearings are used on the worm drive in Ingersoll-Rand's QM-3-DHD-400 "Quarrymaster" —to take heaviest loads, cut maintenance.

How Ingersoll-Rand assures accuracy of "Quarrymaster's" drill feed under 900-blow-per-minute drilling

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And Timken bearing-equipped machines give you the extra advantages of Timken Company leadership in tapered roller bearing design plus service from graduate engineer salesmen. Backing this leadership are the most modern testing, research and development facilities in the bearing industry.

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